Appendix 3.7-C

Watershed Evaluation Report

CALIFORNIA HIGH-SPEED TRAIN

Project Environmental Impact Report / Environmental Impact Statement

Fresno to Bakersfield

Watershed Evaluation Report

May 2013

CALIFORNIA High-Speed Rail Authority

U.S. Department of Transportation
Federal Railroad Administration

CALIFORNIA HIGH-SPEED TRAIN PROJECT

Watershed Evaluation Report

Prepared by:

URS/HMM/Arup Joint Venture

May 2013

Please Note: The wetland delineation data referenced in this report is consistent with the data presented in *Fresno to Bakersfield Revised Draft EIR / Supplemental Draft EIS.* Since the preparation of this report, minor changes to the wetland delineation have been made, resulting in small changes to the extent (acreages) and types of special aquatic resources occurring in the Fresno to Bakersfield Wetland Study Area. These changes are based on recommendations and guidance from the U.S. Army Corps of Engineers (USACE) and were included in interim deliverables to USACE in August and October 2012. A final wetland delineation revision package including additional changes was submitted to USACE in January 2013 and resulted in the issuance of a Preliminary Jurisdictional Determination by the USACE on February 5, 2013. A summary of the modifications to special aquatic resources since the publication of the Revised Draft EIR/Supplemental Draft EIS is provided in Table A.

Changes to special aquatic resources since the preparation of the Revised Draft EIR/Supplemental Draft EIS include the following:

- Revised the extent of ditches, canals, retention/detention basins, a small portion of the Kings River, and vernal pools along the Fresno to Bakersfield alignment based on updated aerial imagery.
- Added ditches, canals, seasonal wetlands and ditches along the Fresno to Bakersfield alignment based on updated aerial imagery.
- Added vernal pools in the Allensworth area, along the BNSF Alternative and the Allensworth Bypass Alternative.
- Removed ditches, retention/detention basins, and seasonal wetlands along the Fresno to Bakersfield alignment that no longer exist based on updated aerial imagery.
- Changed large, linear vernal pools and vernal swales and one ditch to seasonal wetlands and changed one vernal swale to a ditch. These changes generally occurred in the BNSF right-of-way between Corcoran and Allensworth.

Because these changes were made after the preparation of this report and the associated Evaluation of Wetland Conditions Using the California Rapid Assessment Method (CRAM) Report, they are not reflected in this document. Revisions to the wetland delineation as covered by the Preliminary Jurisdictional Delineation may occur as a result of additional engineering changes to the Fresno to Bakersfield alignment. Any such changes will be incorporated into the Final EIR/EIS.

Table A

Modifications to Fresno-Bakersfield Special Aquatic Resources in the Wetland Study Area[a]

Special Aquatic Resource	RDEIR/SDEIS[b] (June 2012)	Interim Deliverable (Aug 2012)	Interim Deliverable (Oct 2012)	PJD (Feb 2013)
Emergent Wetland	0.92	0.92	0.92	0.92
Seasonal Wetland	43.56	43.44	73.05	74.46
Vernal Pool	77.90	72.05	52.46	68.00
Vernal Swale	17.96	16.40	5.71	4.86
Total Wetlands	*140.34*	*132.81*	*132.14*	*148.24*
Canal/Ditch	199.55	206.21	205.92	207.53
Reservoir	117.58	117.58	117.58	117.58
Retention/detention Basin	160.75	159.71	159.24	156.00
Seasonal Riverine	58.33	56.73	56.73	56.26
Total Other Waters of the U.S.	*536.20*	*540.23*	*539.47*	*537.36*
Special Aquatic Resources Total[c]	**676.54**	**673.04**	**671.61**	**685.60**

Notes:

[a] Wetland Study Area includes linear and auxiliary project construction features (i.e., TPSS, switching stations, paralleling stations, road overcrossings, heavy maintenance facilities) plus a 250-foot buffer.

[b] Based on the Supplemental PJWWDR (June 2012)

[c] This total is derived from raw GIS data. As a result, it may not exactly equal the sum of the rounded values presented in the table.

Acronym:
TPSS = traction power supply station

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Acronyms

2008 Mitigation Rule	"Compensatory Mitigation for Losses of Aquatic Resources" (Final rule) (33 C.F.R. Parts 325 and 332 and 40 C.F.R. Part 230)
AA	assessment area
Allensworth ER	Allensworth Ecological Reserve
Authority	California High-Speed Rail Authority
CDFG	California Department of Fish and Game
C.F.R.	Code of Federal Regulations
cfs	cubic feet per second
CRAM	California Rapid Assessment Method
EIR/EIS	Environmental Impact Report/Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	federal Endangered Species Act
F.R.	Federal Register
FRA	Federal Railroad Administration
GIS	Geographic Information System
HST	high-speed train
HUC-8	Hydrologic Unit Code 8
Kern NWR	Kern National Wildlife Refuge
LEDPA	Least Environmentally Damaging Practicable Alternative
MOU	*NEPA/404/408 Memorandum of Understanding*
NHD	National Hydrography Dataset
NRCS	Natural Resources Conservation Service
Pixley NWR	Pixley National Wildlife Refuge
SR	State Route
TWG	Technical Working Group
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service

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Executive Summary

Executive Summary

A watershed-level analysis of aquatic resources for the Fresno to Bakersfield Section of the California High-Speed Train (HST) System (project) has been developed in conformance with the U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency (EPA) April 10, 2008 "Compensatory Mitigation for Losses of Aquatic Resources" (Final rule) (2008 Mitigation Rule) (33 Code of Federal Regulations [C.F.R.] Parts 325 and 332 and 40 C.F.R. Part 230) and California's Level 1-2-3 framework for wetland monitoring and assessment. Also, as required by the *NEPA/404/408 Memorandum of Understanding* (MOU) between the Federal Railroad Administration (FRA), California High-Speed Rail Authority (Authority), EPA, and USACE, dated November 2010 (FRA et al. 2010), a "detailed (rapid assessment or better) assessment of the functions and services of special aquatic sites and other waters of the U.S." has been conducted to assist in the analysis of impacts. The goal of the MOU is to facilitate compliance with the National Environmental Policy Act (42 United States Code [U.S.C.] Section 4321 *et seq.),* Section 404 of the Clean Water Act (33 U.S.C. Section 1344), and Section 14 of the Rivers and Harbors Act (33 U.S.C. Section 408) process for the project-level (Tier 2) Environmental Impact Statement for the project. The integration process comprises three "checkpoints," which punctuate ongoing coordination efforts. The three checkpoints are:

A. Definition of purpose and need for the Tier 2 HST project.

B. Identification of the Range of Alternatives to be studied in the project (Tier 2) Environmental Impact Report / Environmental Impact Statement (EIR/EIS).

C. Preliminary Least Environmentally Damaging Practicable Alternative (LEDPA) Determination; USACE Section 408 Draft Response; and Draft Mitigation Plan consistent with 33 Code of Federal Regulations (C.F.R.) Part 332 and 40 C.F.R. Part 230 (73 Federal Register [F.R.] 19,593, dated April 10, 2008).

This document provides information in support of the Checkpoint C Preliminary LEDPA Determination as it relates to Section 404 of the Clean Water Act. Several Technical Working Group (TWG) meetings occurred to coordinate and communicate technical issues and clarifications regarding the application of the watershed approach, including the Level 1-2-3 assignment of condition values to aquatic features and identification of direct impacts, indirect impacts, and post-project conditions and their application in determining the LEDPA. Two notable directives were produced from the Technical Working Group meetings, one referring to the concept of developing watershed profiles for each particular watershed unit that would be affected by the Fresno to Bakersfield Section and the other referring to the impact assessment framework for the MOU Checkpoint C Preliminary LEDPA Determination and the Section 404(b)(1) determination process.

This report is designed to provide an analysis for the USACE of the extent and quality of wetlands and other jurisdictional features present within the watersheds in which the Fresno to Bakersfield Section of the HST System occurs. The purpose of this evaluation is to provide the USACE information regarding the extent and quality of aquatic resources present in the study areas and the extent to which these features would be affected by the construction and operation of the Fresno to Bakersfield Section. The effect on existing functions and services is analyzed by alignment alternative and design option so that the USACE and can use the data in their determination of the LEDPA.

The proposed project is to construct and operate an HST rail line from Fresno to Bakersfield. The *Fresno to Bakersfield Revised Draft EIR / Supplemental Draft EIS* evaluates 10 alternatives, including the No Project Alternative, the BNSF Alternative and the Hanford West Bypass 1, Hanford West Bypass 2, Corcoran Elevated, Corcoran Bypass, Allensworth Bypass, Wasco-Shafter

Bypass, Bakersfield South, and Bakersfield Hybrid alternatives. Of the nine Fresno to Bakersfield HST Alternatives (excluding the No Project Alternative), one alternative, the BNSF Alternative, spans the entire project length, from Fresno to Bakersfield. The remaining eight alternative alignments deviate from the BNSF Alternative for portions of the route to avoid environmental, land use, or community impacts.

ES1.0 Methods

This Watershed Evaluation Report for the Fresno to Bakersfield Section discusses the methods and analysis used to develop a watershed profile, identifies the existing conditions of the aquatic resources, quantifies direct and indirect impacts on aquatic resources, and estimates the post-project condition of aquatic resources. In some instances, the data used were developed in part at a national or statewide level by others (e.g., the U.S. Fish and Wildlife Service, the U.S. Geological Survey). The Level 1 Watershed Profile uses a number of national and statewide or regional databases to estimate the type, distribution, extent (quantity), and condition of the aquatic resources in each watershed. This information helps identify the regional setting of the aquatic resource impacts expected to occur as part of the implementation of the project.

Direct and indirect impacts are conservatively estimated by overlaying the construction and project footprints on the results of the wetland delineation (Authority and FRA 2012g). The construction and project footprints were used to identify direct impacts, and a 250-foot buffer around the footprints (study area) was used to calculate indirect impacts to adjacent aquatic resources. The existing conditions of the aquatic resources were determined by a two-step process: (1) conducting a site-specific assessment using the California Rapid Assessment Method (CRAM) on a sample of aquatic features that are representative of the types of features found in the study area; and (2) extrapolating the results of the CRAM assessment and assigning a relative condition (i.e., poor, fair, good, or excellent) to all aquatic features. Quantifying impacts, assessing the condition of aquatic resources, and extrapolating the conditions of aquatic features constitute the Level 2 Impact Evaluation.

The model for estimating the post-project conditions of the aquatic resources affected by implementation of the project was developed based on a set of generated projections. The projections used and extrapolated post-project conditions based on the type of aquatic resource affected, the location within the construction or project footprints, the type of impact (direct or indirect), and the existing relative condition. A similar set of projections were generated to assess the risk (low, moderate, or high) of loss or change to aquatic resources as a result of indirect impacts.

ES2.0 Aquatic Resources

A number of aquatic resources were identified in the study area, including federal-jurisdictional wetlands, other waters of the U.S., and riparian areas. Identified wetland features include seasonal wetlands, emergent wetlands, and vernal pools and swales. Other waters of the U.S. identified in the study area include canals/ditches, lacustrine, and seasonal riverine. Additionally, riparian areas, that are generally found in association with seasonal riverine features, were identified and are discussed with aquatic resources because of the important functions they provide that affect water quality, including groundwater recharge, surface water supply, nutrient cycling, water filtration, temperature control, maintenance of plant and animal communities, sediment transport and storage, stream channel dynamic equilibrium, and streambank stabilization. Many of the jurisdictional waters in the study area have been leveled, drained, and/or leveed for agricultural purposes (to prevent flooding).

The physical and biological characteristics of the various features are largely dictated by whether the feature is manipulated or natural. Manipulated features include all jurisdictional water

features except vernal pools and swales. Manipulated features contain substrates that have been altered through excavation, filling, dredging, or accretion of sediments; these substrates typically range from sandy and coarse-loamy to fine-silty, fine-loamy, and fines (depending on location in the study area). Natural features such as vernal pools and swales have substrates composed of natural alkaline soils, which are harsh environments for microbes and plants and contain low levels of organic matter.

ES3.0 Level 1 Watershed Profile

The Fresno to Bakersfield Section is located in the Tulare Lake Basin; specifically the project is located in seven U.S. Geological Survey HUC-8 sub watersheds basins:

- Upper Dry Watershed (18030009)
- Tulare–Buena Vista Lakes Watershed (18030012)
- Upper Kaweah Watershed (18030007)
- Upper Tule Watershed (18030006)
- Upper Deer–Upper White Watershed (18030005)
- Upper Poso Watershed (1803004)
- Middle Kern–Upper Tehachapi–Grapevine Watershed (1803003)

All of these watersheds are in the Tulare Lake Basin, which covers a large and diverse area in California. The profiles of each of the watersheds within the areas of the Fresno to Bakersfield Section alternatives share many similarities across the Tulare Lake Basin. All of the watersheds are characterized by mostly protected headwaters. In the Sierra Nevada Foothills and the Mountains and the Coast Ranges ecological sections, the impacts that degrade the quality of the aquatic features are mostly dams and associated reservoirs. Proportionally within each watershed, these ecological sections do not contribute nearly as much acreage and linear feet of aquatic features as does the Great Valley ecological section.

Throughout the Tulare Lake Basin and across all the watersheds in the study area, the valley has largely been manipulated through agriculture, transportation and urban development. These conversions have resulted in the loss, manipulation, and degradation of aquatic resources through upper watershed impoundments, removal of riparian vegetation, and other hydrological manipulations. These activities have largely resulted in the extensive reduction of riparian habitat, the accretion of streams, and the loss of Tulare Lake, Buena Vista Lake, and Kern Lake as well as an extensive loss of other sensitive aquatic features (i.e., vernal pools and swales).

Furthermore, the historical and current land use patterns have blurred the boundaries of the watersheds through the construction of an extensive network of irrigation canals and ditches. Due to the north-south orientation and linear nature of the Fresno to Bakersfield Section, impacts to aquatic features occur across all seven watersheds. However, most of the Fresno to Bakersfield alternatives have relatively small footprints within a few different watersheds.

The Fresno to Bakersfield Section occurs entirely within the Great Valley ecological section. The project impact profile and the subsequent compensatory mitigation are similar across all seven watersheds, except perhaps the Upper Deer–Upper White Watershed. The Upper Deer–Upper White Watershed contains a significantly greater area of vernal pool landscapes and should be a focus of compensatory mitigation efforts.

The 2008 Mitigation Rule states a preference for mitigation using a watershed approach, but acknowledges that for linear projects, where impacts are distributed across multiple watersheds, more ecological functions and values may be created, enhanced, or restored in fewer consolidated mitigation projects. Because of the degraded condition of aquatic resources in the region, the focus of compensatory mitigation will be on consolidated mitigation projects because

they provide the best opportunity to benefit the region. The mitigation may also be consolidated in the watersheds that would experience significant ecological loss of aquatic resources in excellent or good condition.

ES4.0 Level 2 Impact Evaluation

The Level 2 Impact Evaluation describes the impacts to aquatic resources, identifies the existing conditions of those resources, estimates their post-project condition, summarizes the details of a Compensatory Mitigation Plan to offset the negative effects, and discusses the overall net condition of the associated watersheds. The evaluation is conducted for each of the proposed Fresno to Bakersfield alternatives. The impact profile has three components: direct-permanent impacts, direct-temporary impacts (in areas where the impact would occur only during construction), and indirect (and indirect-bisected) permanent impacts adjacent to the construction and project footprint (within a 250-foot buffer).

Impacts are presented in a manner that allows for a comparison of the HST alternative alignments (Table ES-1). Under the BNSF Alternative, the acreage reflects the total impact that would occur along the only end-to-end alternative. To compare the other project alternatives and design options, the table contains two numbers for each of these other alternatives: the first number is the impact acreage anticipated for the given alternative; the second number is the change (or delta) when compared against the corresponding segment of the BNSF Alternative: positive (+) differences indicate that the alternative alignment results in more impact acres than its corresponding segment of the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in fewer impact acres than its corresponding segment of the BNSF Alternative.

The impact evaluation provides an analysis of the project impacts based on watershed and alternative alignment. The data suggest that certain alignment alternatives will either reduce or increase the project’s impacts to aquatic resources. In some instances, one alternative may increase impacts to one type of feature, but reduce impacts to another type of feature or condition classification. These evaluations primarily focus on direct-permanent impacts to aquatic features that are natural, are hard to replace, or are in fair to excellent condition. The information provided in the main body of the report provides an evaluation for all features, in all condition classifications (poor, fair, good, and excellent), for all types of impacts (direct-permanent, direct-temporary, indirect-bisected, and indirect). However, for the purpose of the Executive Summary, the evaluation only covers the total impacts based on the type of impact and the total impacts based on the condition.

In general, the focus is first and foremost on impacts to aquatic resources that are in excellent or good condition, secondarily on impacts to aquatic resources in fair condition, and lastly on impacts to aquatic resources in poor condition. Similarly, impacts that are direct-permanent are more severe than those that are direct-temporary, indirect-bisected, or indirect. Additional analysis of other environmental resources and impacts (e.g., other biological resources, cultural resources, important farmland) and evaluation with respect to cost, logistics, and technology should be conducted when evaluating and selecting the LEDPA.

Table ES-1
Summary Comparison of Direct-Permanent and Other Impacts on Aquatic Resources by Alternative

Wetlands and Other Waters (TYPE/HST water type)	Impact Type /Feature Type [a]	Alternative										
		BNSF Impact Acreage	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
			Impact Acreage / Difference Compared with Corresponding BNSF Area [b]									
Total Impacts by Impact Type and Alternative												
Total Impacts	Direct-Permanent	100.95	16.47 / +2.20	15.02 / +0.75	13.03 / -1.24	11.57 / -2.70	15.04 / -6.13	14.00 / -7.17	23.70 / -15.01	4.78 / -3.28	5.39 / -0.18	6.08 / +0.52
	Direct-Temporary	13.01	1.44 / +0.85	1.44 / +0.85	1.54 / +0.96	1.54 / +0.96	0.90 / +0.02	5.18 / +4.31	2.72 / +1.20	1.16 / -1.46	3.92 / -0.22	3.89 / -0.25
	Indirect-Bisected	23.88	—	—	—	—	4.76 / -0.73	— / -5.49	1.73 / -15.52	—	—	—
	Indirect	361.16	43.41 / -5.66	36.47 / -12.61	55.01 / +5.93	48.06 / -1.01	36.27 / +9.21	28.47 / +1.41	154.68 / -31.78	12.34 / -7.21	32.87 / -14.05	32.28 / -14.64
Total Impacts to Poor Aquatic Resources		274.84	44.15 / +14.77	36.71 / +7.32	41.40 / +12.01	33.95 / +4.57	44.56 / +2.54	38.64 / -3.38	102.47 / -8.74	18.28 / -11.94	23.83 / -2.18	23.90 / -2.11
Total Impacts to Fair Aquatic Resources		128.37	7.17 / +2.45	6.22 / +1.49	18.18 / +13.46	17.23 / +12.50	12.39 / -0.17	8.99 / -3.57	71.53 / -25.01	—	— / -0.86	— / -0.86
Total Impacts to Good Aquatic Resources		94.26	10.00 / -19.82	10.00 / -19.82	10.00 / -19.82	10.00 / -19.82	0.01 / 0.00	0.01 / 0.00	8.83 / -25.84	—	18.35 / -11.41	18.35 / -11.41
Total Impacts to Excellent Aquatic Resources		1.53	—	—	—	—	—	—	— / -1.53	—	—	—

Table ES-1
Summary Comparison of Direct-Permanent and Other Impacts on Aquatic Resources by Alternative

Wetlands and Other Waters (TYPE/HST water type)	Impact Type /Feature Type [a]	Alternative										
		BNSF Impact Acreage	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
			Impact Acreage / Difference Compared with Corresponding BNSF Area [b]									

Notes:

— = No impact or not applicable

[a] Indirect impacts are calculated within a 250-foot buffer of the project footprint, which includes areas of permanent and temporary impacts.

[b] The "Difference Compared with Corresponding BNSF Area" represents the difference in impact acreages between an alternative alignment and its corresponding segment in the BNSF Alternative: positive (+) differences indicate that the alternative alignment results in more impact acres than its corresponding segment in the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in fewer impact acres than its corresponding segment in the BNSF Alternative.

Impact calculations in this table include alignment alternatives and station alternatives, but do not include the heavy maintenance facility (HMF) site alternatives.

All impacts were calculated based on the 15% engineering design construction footprint.

ES5.0 Compensatory Mitigation

Compensatory mitigation for adverse impacts to aquatic resources will be determined in consultation with the USACE and in part through the assessment of aquatic resource conditions that would be lost or impaired through construction and operation of the Fresno to Bakersfield Section of the HST System. Compensatory mitigation will preserve, create, and/or enhance aquatic resource conditions, functions, values, and services.

The compensatory mitigation should focus on improving conditions within watersheds where the linear project has the most significant detriment, where opportunities for improvement are present, and where the mitigation can provide the greatest benefit to the overall condition of the watershed. The latter can be implemented by focusing mitigation efforts on restoring historically predominant and valuable aquatic resources in the landscape that have been lost over time, namely Tulare Lake and its associated emergent wetlands. Though not impacted by this project, the historical loss of Tulare Lake to development and land conversion represents the greatest aquatic habitat loss in the Central Valley. Therefore, restoration of Tulare Lake through compensatory mitigation would greatly benefit watershed condition.

Because the watershed profile and impact evaluation identified significant vernal pools and swales in the Upper Deer–Upper White Watershed, compensatory mitigation should focus on maintaining or improving these features and the overall conditions in this watershed. Other watersheds that have significant areas of vernal pools and swales in good condition—and therefore present an opportunity for improvement that should be considered for vernal pool compensatory mitigation—include the Upper Dry, Tulare–Buena Vista Lakes, Upper Kaweah, and Upper Tule watersheds. Compensatory mitigation for impacts to seasonal riverine features could occur in any of the identified watersheds because these features are present in all watersheds. Out-of-kind mitigation should focus on creation or restoration of Tulare Lake and historical emergent wetlands. Selection of compensatory mitigation sites should focus on areas where there is connectivity to protected lands, up-stream stressors are absent or reduced, and opportunities for stream and riparian habitat enhancement or restoration are available.

To date, several permittee-responsible mitigation options have been identified that may be suitable to partially or fully mitigate potential impacts to aquatic resources. Five potential mitigation sites containing aquatic features have been identified. Other properties are currently being considered and will be evaluated when the potential for mitigation has been analyzed in more detail. Suitable opportunities exist to satisfy mitigation obligations in the potential permittee-responsible mitigation properties and in unidentified areas within the project watersheds.

ES6.0 Summary

From the detailed evaluation of the Level 1 Watershed Profile and the results of the Level 2 Impact Evaluation, several conclusions are apparent. The conclusions of the Level 1 Watershed Profile are affirmed by the Level 2 Impact Evaluation, both in terms of the conditions in the watersheds and the land uses identified in the watersheds. The themes identified in the Level 1 Watershed Profile are consistent with the conditions observed in the study area:

A. The vast majority of the aquatic resources in the Great Valley have been significantly degraded through extensive conversion to agricultural, urban, and transportation land uses. As a result, aquatic features are generally in poor condition, though some features, including seasonal riverine and vernal pools and swales, are generally in excellent or good condition. The condition of features in the study area is generally tied to the type of feature: man-made or manipulated features are typically in poor or fair condition and natural features are generally in good or excellent condition. These conditions were

anticipated by the Level 1 Watershed Profile and supported in the study area by the CRAM results. However, some vernal pools and swales near the Corcoran alternatives are in fair condition because they are near major stressors (State Route 43 and the existing BNSF Railway tracks).

B. The relative abundance and condition of aquatic resources in the study area reflect the relative condition of habitats within their watersheds. For example, aquatic resources within the study area identified through CRAM as being in relatively "poor" condition generally correspond to habitats in the greater watershed most impacted by altered hydrology and land conversion. Likewise, aquatic resources within the study area identified through CRAM as being in relatively "good" condition generally correspond to relatively natural habitats in the watershed.

C. As described in Section 6.1, Impacts on Aquatic Resources, and Section 6.2, Existing Conditions, most aquatic features in the study area are man-made or manipulated. Natural aquatic features are present in the study area, but their acreage and distribution are limited. The natural aquatic features present (vernal pools and swales and seasonal riverine features) are generally in better condition, but many of these features have been subject to disturbance associated with the conversation of adjacent areas and, in the case of seasonal riverine features, the reduction of the flood channel and riparian areas.

D. Similar aquatic features (canals/ditches, lacustrine, emergent wetlands, seasonal wetlands, seasonal riverine, riparian (not USACE jurisdictional), and vernal pools and swales) are present throughout the study area. Many of these aquatic resources have been manipulated or are man-made to support agricultural land use practices. However, as discussed in the Level 1 Watershed Profile, a relatively high density of vernal pool features is present in the Upper Deer–Upper White Watershed, which is associated with the Allensworth alternatives.

E. Due to the presence of extensive networks of canals and water diversions, clear watershed boundaries were not observed.

The above themes, which are discussed in detail in the Level 1 Watershed Profile and the Level 2 Impact Evaluation, reduce the potential for the project to result in a net negative impact on the project watersheds. The results of the watershed profile and project impact evaluation (both in terms of quantity and quality) indicate that compensatory mitigation will be conducted in select areas and will focus on select watersheds (consistent with project impacts to sensitive resources). Sufficient opportunities will be available to provide significant enhancements and benefits to one or more recipient watersheds that will, in both the short term and the long term, provide local and regional ecological benefit (or lift) to the watersheds and the condition of the associated aquatic features. At the conclusion of project implementation (i.e., after impacts and compensatory mitigation), the condition of the watersheds would be sustained or enhanced through the long-term preservation of aquatic resources and would experience no net loss of aquatic functions, values, or services (i.e., condition).

The project impacts to existing aquatic resources are organized by watershed and by project alternative so that the project proponents (i.e., Authority and FRA), along with USACE and EPA, can use this report to evaluate, identify, and compare the preferred project alternative and ultimately assist in the identification of the preliminary LEDPA.

Section 1.0
Introduction

1.0 Introduction

1.1 Purpose

A watershed-level analysis of aquatic resources for the Fresno to Bakersfield Section of the California High-Speed Train (HST) System has been developed in conformance with the U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency (EPA) April 10, 2008 "Compensatory Mitigation for Losses of Aquatic Resources" (Final rule) (2008 Mitigation Rule) (33 Code of Federal Regulations [C.F.R.] Parts 325 and 332 and 40 C.F.R. Part 230) and California's Level 1-2-3 framework for wetland monitoring and assessment.

The Level 1-2-3 framework builds on information gathered at each of three levels (Level 1-2-3). Level 1 is the Watershed Profile, Level 2 is the Rapid Wetland Assessment/Impact Evaluation and Level 3 is the Intensive Site Assessment.

The Level 1 Watershed Profile is used to characterize land uses and the distribution and abundance of wetland types across an area. This level of assessment is used to determine the geographical priorities where more intensive wetland monitoring is to occur and to identify environmental indicators that can be monitored to approximate wetland conditions. The resulting data layers and landscape profiles provide valuable information to guide wetland protection and restoration decisions, including the location and design of compensatory mitigation projects.

The Level 2 Rapid Wetland Assessment/Impact Evaluation evaluates the general condition of individual wetlands using relatively simple indicators. These assessments are based on identifying stressors, such as road crossings, encroachments, and hydrologic alterations. Rapid wetland assessment methods are used to monitor and report on the condition of wetlands in a watershed and to identify sites where more intensive monitoring is needed. Results are also used in Clean Water Act (CWA) Section 401/404 permitting and other wetland decisions and can be used to evaluate the performance of compensatory wetland mitigation and other restoration projects.

The Level 3 Intensive Site Assessment is necessary to test the indicators used in rapid wetland assessments and to validate landscape level assessments. Intensive Site Assessment requires the identification of wetland reference conditions. This level of assessment is also used to determine the attainment of water quality standards at individual wetlands.

This Watershed Evaluation Report evaluates and provides the Level 1 and Level 2 evaluations and accomplishes the following tasks:

- Develops a data layer of land use types that represent disturbance categories.
- Inventories the aquatic resources within Hydrologic Unit Code 8 (HUC-8) watershed units (per land use type).
- Determines the type, amount, and relative condition of the aquatic resources in the watershed units and in the footprints of the HST alternatives in the Fresno to Bakersfield Section.
- Evaluates and assigns a relative existing condition to all aquatic resources in the Fresno to Bakersfield Section alternatives within the watersheds.
- Evaluates the relative post-project condition of the aquatic resources in the watersheds associated with the alternatives.
- Describes the approach to compensatory mitigation and provides a summary of potential compensatory mitigation properties.

- Considers the net change in the acreage and condition of the watersheds considering both post-project condition and compensatory mitigation.

The analysis methods, tools, and approach, such as the use of the California Rapid Assessment Method (CRAM), used to evaluate the functional condition of aquatic resources affected by the project and the post-project condition are provided in this Watershed Evaluation Report.

This Watershed Evaluation Report includes an overview of the process whereby the watershed-level analysis was conceived, planned, and implemented; this report also provides an analysis of currently available, watershed-level Geographic Information System (GIS) data to gather information about the types and relative conditions of the aquatic resources. The overall approach was discussed within an interagency group referred to as the Technical Working Group (TWG). The appendices to this report are as follows:

- Appendix A, Evaluation of Wetland Conditions Using the California Rapid Assessment Method (CRAM).
- Appendix B, Impact Evaluation Schematics.

1.2 Regulatory Context

This section discusses the regulatory context for the Watershed Evaluation Report within the existing Checkpoint C framework of the Environmental Impact Report / Environmental Impact Statement (EIR/EIS) process for the Fresno to Bakersfield Section of the HST System.

1.2.1 The MOU Process and Checkpoint C

The *NEPA/404/408 Memorandum of Understanding* (MOU) between the Federal Railroad Administration (FRA), California High-Speed Rail Authority (Authority), EPA, and USACE, dated November 2010 (FRA et al. 2010) and the Checkpoint C Preliminary LEDPA Determination require a "detailed (rapid assessment or better) assessment of the functions and services of special aquatic sites and other waters of the U.S." to assist in the analysis of impacts. The goal of the MOU is to facilitate compliance with the National Environmental Policy Act (42 United States Code [U.S.C.] Section 4321 *et seq.*), Section 404 of the Clean Water Act (33 U.S.C Section 1344), and Section 14 of the Rivers and Harbors Act (33 U.S.C. Section 408) process for the project-level (Tier 2) Environmental Impact Statement for the project. The integration process comprises three "checkpoints," which punctuate ongoing coordination efforts. These checkpoints are:

A. Definition of purpose and need for the Tier 2 HST project.

B. Identification of the Range of Alternatives to be studied in the project (Tier 2) EIR/EIS.

C. Preliminary Least Environmentally Damaging Practicable Alternative (LEDPA) Determination; USACE Section 408 Draft Response; and Draft Mitigation Plan consistent with 33 C.F.R. Part 332 and 40 C.F.R. Part 230 (73 Federal Register [F.R.] 19,593, dated April 10, 2008).

This document provides information in support of the Checkpoint C Preliminary LEDPA Determination as it relates to the Section 404 of the Clean Water Act.

The CRAM is a tool for performing wetland condition assessments and meets the standards for "detailed (rapid assessment or better) assessment of the functions and services of special aquatic sites and other waters of the U.S" required by the MOU. Using CRAM across all sections of the California HST System provides a uniform approach to assessing wetland health and watershed needs and is consistent with the 2008 Mitigation Rule. CRAM works by scoring metrics that are

part of four key attributes: landscape and buffer, hydrology, physical structure, and biotic structure (CWMW 2012).

The *Condition Assessment Technical Work Plan* (Authority and FRA 2011a) details the technical approach to conducting the condition assessment for the Fresno to Bakersfield Section of the HST System. This Watershed Evaluation Report summarizes the overall approach, presents the outcome of the analysis, and draws conclusions about the effects of the project on the watersheds.

1.2.2 Technical Working Group

Several TWG meetings occurred to coordinate and communicate technical issues and clarifications regarding the application of the watershed approach. These technical issues included Level 1-2-3, assignment of condition values to aquatic features; identification of direct impacts, indirect impacts, and post-project conditions, and their application in determining the least environmentally damaging practicable alternative (LEDPA). Members of the TWG included the USACE, EPA, the State Water Resources Control Board, FRA, the Authority, and the Authority's regional consultants (for the Fresno to Bakersfield Section, the URS/HMM/Arup Joint Venture). The details of TWG meeting and the key discussion topics are summarized below.

The TWG meetings focused on discussion of the application of the 2008 Mitigation Rule, the Level 1-2-3 Framework, including development of Level 1 Watershed Profile and the Level 2 CRAM field assessment, impact assessment methodology (direct and indirect; permanent and temporary), methods to extrapolate CRAM scores into relative conditions for all aquatic features, and potential relative sensitivity to indirect impacts. The discussions and information that came out of them assisted in the development of this Watershed Evaluation Report, the Evaluation of Wetland Conditions Using the California Rapid Assessment Method (CRAM) Report (Appendix A), mitigation planning and the development of the Compensatory Mitigation Plan, and the *Fresno to Bakersfield Section: Checkpoint C Summary Report* (Authority and FRA 2012e).

Two notable products were produced from the TWG meetings, one referring to the concept of developing watershed profiles for each particular watershed unit affected by the Fresno to Bakersfield Section and the other referring to the assessment framework for Checkpoint C and the Section 404(b)(1) determination process. These two products were integrated into the Checkpoint C Summary Report (Authority and FRA 2012e), this Watershed Evaluation Report, and the Evaluation of Wetland Conditions Using the California Rapid Assessment Method (CRAM) Report (Authority and FRA 2012c; see also Appendix A).

1.2.2.1 Watershed Approach (August 2011)

The watershed approach relies on the use of a "watershed profiles" and project "impact profiles" (Sumner 2011). A component of the Section 404(b)(1) analysis is comparing the aquatic resource in the watershed profiles with the impact profiles for each HST alternative alignment to help make decisions as they concern compensatory mitigation and the net post-project condition of the watershed.

A watershed profile is a coarse estimation of the abundance and condition of types of aquatic resources in a project watershed area. A watershed profile is constructed by tabulating the relative abundance, diversity (of types), and condition of aquatic resources in project watershed areas. Project watershed areas are geographically bounded areas of watersheds that encompass the HST alternative alignments. California water planning watershed maps, U.S. Geological Survey (USGS) HUC-8 maps, and Level 4 Ecoregion maps can be used to demarcate project watershed area boundaries.

The abundance and type of aquatic resources within a project watershed area are gleaned from existing databases, such as the National Wetland Inventory, the National Hydrography Dataset (NHD), and the Holland Central Valley Vernal Pool Complexes dataset. The conditions of aquatic resources are suggested in a broad sense by overlaying the mapped occurrences of aquatic resources onto generally classified land use maps. This broad-scale analysis indicates general distribution of aquatic resources, the degree of interrelation among aquatic resources in the landscape, and the existence of landscape stressors and landscape buffers for aquatic areas.

An impact profile identifies both the amount (quantity) of aquatic resources affected (acreage and/or linear feet) and the condition of the aquatic resources (excellent, good, fair, or poor) extrapolated from the CRAM results. Each impact profile is then summarized by aquatic resource type and the type of impact (direct or indirect and permanent or temporary). The impact profile also includes an analysis of the post-project condition of the aquatic resources. Where applicable, this Watershed Evaluation Report summarizes these impacts and discusses them for each of the seven watersheds evaluated.

The precision (quality) of the estimates used in the impact profiles is sufficiently robust to make a relative comparison between the alternative alignments (e.g., an order of magnitude comparison; see Sumner 2011). Based on guidance received from the TWG meetings, the assessment approach used in this Watershed Evaluation Report, including CRAM sampling and extrapolation of survey results, meets this quality standard.

Combining the watershed profiles with the impact profiles helps determine the extent, if any, of substantial net impacts attributed to each of the alternative alignments. The criterion for making that determination is whether there is a risk that an alternative's impact profile will substantially degrade current-day watershed profiles. Special consideration is given to aquatic resource types in the watershed profile that are relatively rare, highly valued, or difficult to mitigate (e.g., restore, re-establish).

1.2.2.2 Assessment Framework (September 2011)

An assessment framework was developed to summarize the types of analyses required by Checkpoint C. The components (or factors) of this framework include:

1. Aquatic resource acreage affected, classified by aquatic resource type and type of impact (direct and indirect), including non-wetland waters and wetlands.
2. Amount of impact on important/rare wetland acreage, which includes difficult-to-replace wetlands (e.g., vernal pools, seasonal riverine with riparian area).
3. Amount of impact on special-status habitats, including aquatic habitats, species listed under the federal Endangered Species Act (ESA), and ESA critical habitat.
4. Amount of impact on aquatic resources in good condition along the alignments, which is determined using both Level 1 and Level 2 (i.e., CRAM) data.
5. Relative risk of net project impact on the watershed.

In this context, net project impact means the extent to which impacts assessed at a smaller scale (an alignment) are likely to have a substantial effect on the functioning of the broader landscape. Each alternative is qualitatively evaluated relative to its risk of causing a net impact. The assessment of this factor is a qualitative comparison of the relative adverse effect of impacts along alternative alignments on the overall abundance, diversity, and condition of aquatic resources in the project watershed area(s). In other words, net impact is a comparison of the impact profile of each alignment (#1 through #4, above) with the broader "watershed profiles."

This watershed profile informs the impact review, and is useful in mitigation planning (i.e., using the "watershed approach" pursuant to the federal rule and the pending state rule). For example, if direct and net impacts cannot be adequately mitigated, then there is a risk of significant degradation.

In addition to the factors listed above, other assessment factors are also considered in making a LEDPA determination; these include nonaquatic habitat, cultural resources, community impacts, agriculture, etc.

Assessment factors required for making a permit determination based on the EPA Section 404(b)(1) Guidelines (alternative analysis and mitigation requirements) include:

1. Identification of the LEDPA.
2. Environmental restrictions (e.g., ensuring there are no violations of water quality standards, the ESA, and sanctuaries).
3. Significant degradation of waters of the U.S. (e.g., ensuring there is no significant degradation, which depends on the net impact, including mitigation).
4. Mitigation includes an examination of the relative amount of mitigation opportunity associated with each alternative and the potential for mitigation elements to enhance the overall area and/or quality of aquatic resources within each planning watershed and the project as a whole (as required by the 2008 Mitigation Rule). Addressing these requirements includes the completion of a mitigation plan for the selected LEDPA (taking into consideration watershed profiles and other site-specific information) and taking appropriate and practicable steps to minimize adverse impacts (i.e., applicants must take all appropriate and practicable steps to minimize adverse impacts on the aquatic environment).

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Section 2.0
Project Description

2.0 Project Description

The proposed action is to construct and operate an HST rail line from Fresno to Bakersfield (Figure 2-1). The Fresno to Bakersfield Section is one of nine sections that were identified in the Program EIR/EISs (Authority and FRA 2005, 2008, 2010). The nine HST sections constitute a system that would connect the major population centers of the San Francisco Bay Area with the Los Angeles metropolitan region. The California HST System is planned to be implemented in two phases. Phase 1 would connect San Francisco to Los Angeles and Anaheim via the Pacheco Pass and the Central Valley. Phase 2 would connect the Central Valley (Merced Station) to the state's capital, Sacramento, and another extension would connect Los Angeles to San Diego. The HST System is envisioned as a state-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology system that would employ the latest technology, safety, signaling, and automated train control systems. The trains would be capable of operating at speeds of up to 220 miles per hour over fully grade separated, dedicated tracks.

The Fresno to Bakersfield HST Section would be a critical link in the Phase 1 HST System connecting San Francisco and the Bay Area to Los Angeles and Anaheim. The Authority and the FRA's prior program EIR/EIS documents selected the BNSF Railway route as the preferred alternative for the Fresno to Bakersfield Section in the 2005 Statewide Program EIR/EIS decision document. Therefore, the project EIR/EIS for the Fresno to Bakersfield Section focuses on alternative alignments along the general BNSF Railway corridor.

The *Fresno to Bakersfield Section: Revised Draft EIR / Supplemental Draft EIS* (Authority and FRA 2012a) evaluates 10 alignment alternatives, including the No Project Alternative, the BNSF Alternative and the Hanford West Bypass 1, Hanford West Bypass 2, Corcoran Elevated, Corcoran Bypass, Allensworth Bypass, Wasco-Shafter Bypass, Bakersfield South, and Bakersfield Hybrid alternatives (Figure 2-2). Of the nine Fresno to Bakersfield Section alternatives, eight alternatives deviate from the BNSF Alternative for portions of the route to avoid environmental, land use, or community impacts.

The infrastructure and systems for the Fresno to Bakersfield Section alternatives are composed of trains (rolling stock), tracks, grade-separated right-of-way, stations, train control, power systems, and maintenance facilities. The design of each alternative includes a double-track right-of-way to accommodate planned project operational needs for uninterrupted rail movement. Also, the HST System safety criteria preclude any at-grade intersections, and therefore the system must be grade separated from any other transportation system. This requirement means that planning the HST System would also require grade-separated overcrossings for roadways or roadway closures and modifications to existing systems that do not span the planned right-of-way.

The Fresno to Bakersfield Section would consist of a fully dedicated rail line, constructed from continuous welded steel rail. In the Fresno to Bakersfield Section, the alternatives would use four different track profiles. These track types have varying profiles: low, near-the-ground tracks are at-grade; higher tracks are elevated or on retained fill; and below-grade tracks are in a retained cut. Types of bridges that might be built include full channel spans, large box culverts, or, for some wider river crossings, limited piers within the ordinary high-water channel. Besides the alternative alignments, two station alternatives in Fresno, two potential station locations in the Hanford area, three station alternatives in Bakersfield, and five potential heavy-maintenance facility alternatives are considered.

The Fresno to Bakersfield Section would connect to Merced in the north and to Palmdale in the south. A heavy maintenance facility would be sited in either the Merced to Fresno Section or the Fresno to Bakersfield Section. Additional details on project features and construction are presented in the *Fresno to Bakersfield Section: Revised Draft EIR / Supplemental Draft EIS* (Authority and FRA 2012a).

Figure 2-1
Fresno to Bakersfield Section of the California HST System

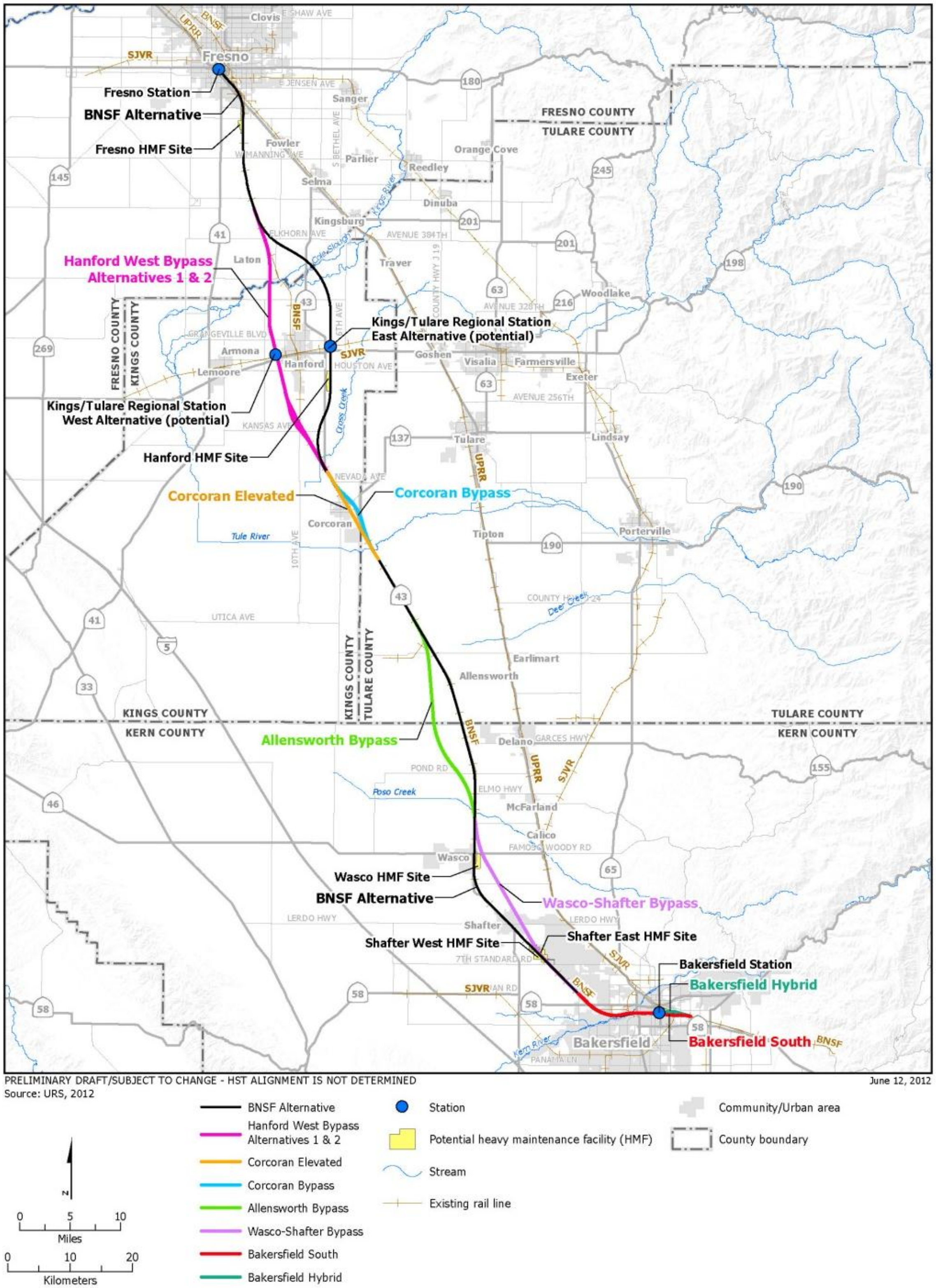

Figure 2-2
Fresno to Bakersfield Section alternatives

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Section 3.0
Methodology

3.0 Methodology

This section describes the methods used to develop the Level 1 and Level 2 analyses presented in this report. The analyses include developing a watershed profile, identifying the existing conditions of the aquatic resources, quantifying direct and indirect impacts on aquatic resources, and estimating the post-project condition of the aquatic resources. In some instances, the data used were developed in part at a national or statewide level by other sources (e.g., the U.S. Fish and Wildlife Service [USFWS], USGS). In other instances, the information used was collected and developed by the Authority's regional consultant, the URS/HMM/Arup Joint Venture. Information collected by the URS/HMM/Arup Joint Venture is described in more detail in the *Fresno to Bakersfield Section: Revised Draft EIR / Supplemental Draft EIS* (Authority and FRA 2012a), the *Fresno to Bakersfield Section: Biological Resources and Wetlands Technical Report* (Authority and FRA 2012b), the *Fresno to Bakersfield Section: Preliminary Jurisdictional Waters and Wetland Delineation* (Authority and FRA 2011b), the *Fresno to Bakersfield Section: Supplemental Preliminary Jurisdictional Waters and Wetlands Delineation Report* (Authority and FRA 2012g), and the *Fresno to Bakersfield Section: Evaluation of Wetland Conditions Using the California Rapid Assessment Method* (CRAM) *Report* (Authority and FRA 2012c).

The Level 1 Watershed Profile uses a number of national and statewide or regional databases to estimate the types, distribution, extent (quantity), and condition of the aquatic resources in each watershed. This information helps identify the regional setting of the aquatic resource impacts expected to occur as part the implementation of the project. Direct and indirect impacts are conservatively estimated by overlaying the construction and project footprints on the results of the wetland delineation as presented in the *Fresno to Bakersfield Section: Supplemental Preliminary Jurisdictional Waters and Wetlands Delineation Report* (Authority and FRA 2012g).

The construction and project footprints were used to identify direct impacts. A 250-foot buffer around the footprints (i.e., the study area) was used to calculate indirect impacts to adjacent aquatic resources. The existing conditions of the aquatic resources were determined by a two-step process: (1) conducting a site-specific assessment using CRAM on a sample of aquatic features representative of the type of features found in the study area; and (2) extrapolating the CRAM results and assigning a relative condition (i.e., poor, fair, good, or excellent) to the aquatic features. The Level 2 Impact Evaluation consists of quantifying the impacts, assessing the condition of the aquatic resources, and extrapolating the conditions of the aquatic features.

The model for estimating the post-project conditions of the aquatic resources directly affected by implementation of the project was developed based on a set of projections that extrapolated post-project condition based on the type of aquatic resource affected, the location within the construction or project footprints, the type of impact (direct or indirect), and the existing relative condition. A similar set of projections was generated to assess the risk (low, moderate, or high) of loss or change to aquatic resources as a result of indirect impacts.

The methods, as employed and described herein, were largely developed in close coordination with the USACE and EPA as part of the TWG meetings.

3.1 Methodology: Watershed Evaluation

A Level 1 Watershed Profile was developed to provide an analysis and description of the seven HUC-8 watersheds that intersect the Fresno to Bakersfield Section alternative alignments. For each watershed, the profile includes a description of the major aquatic features and associated land uses. In the analysis, land use is a proxy to distinguish higher-quality aquatic features from features that are likely degraded. Aquatic features in high-intensity land use types were considered to be degraded based simply on surrounding land uses. Conversely, aquatic features in low-intensity and natural land use types are considered less disturbed. The land uses for each

watershed were identified using a number of existing datasets that have been developed by State of California regulatory agencies, including:

- California Essential Habitat Connectivity Project Natural Landscape Blocks (Spencer et al. 2010) map and classify areas of natural land. The California Department of Fish and Game and the California Department of Transportation commissioned the California Essential Habitat Connectivity Project to assist in land use planning, transportation planning, land management, and conservation planning. This dataset provides an assessment of natural lands and assists users in avoiding, minimizing, and mitigating impacts to habitat connectivity during the transportation-planning process. The Essential Habitat Connectivity Project identifies natural landscape blocks through a number of approaches, including the use of the Ecological Condition Index developed for the California Legacy Project (Davis et al. 2003, 2006); the Essential Habitat Connectivity Project also considers conservation protection status and areas known to have high biological value.

- California GAP Analysis Land-Cover for California (UCSB 2002) maps land cover and natural communities. The California GAP Analysis Land-Cover for California is a product of a number of vegetation mapping systems that are best described provisionally as the National Vegetation Classification Standards (more recently known as the "UNESCO/TNC system"). This dataset also incorporates aspects of the California Natural Diversity Database vegetation descriptions for natural land use types and USGS methods for identifying non-vegetation and human-induced land use categories (e.g., urban, barren, agricultural land uses) (Anderson et al. 1976).

The various land uses were categorized by land use intensity into the following categories: relatively undisturbed (natural), low-intensity agriculture, and high-intensity agriculture/developed land.

Aquatic features within each watershed were mapped using a number of available databases that are widely accepted and used for understanding the locations and types of aquatic resources within a given region. These databases were produced or funded by the following natural resource regulatory agencies:

- The National Wetlands Inventory (USFWS 2011b), which identifies the approximate locations and types of wetlands in each watershed. This dataset was used to calculate acreage and map locations of the following wetland types within each watershed:

  - Emergent wetland: herbaceous marsh, fen, swale, or wet meadow.
  - Forested/shrub wetland: forested swamp or wetland shrub bog or wetland.
  - Freshwater pond: pond.
  - Lake: lake or reservoir basin.
  - Other wetland: farmed wetland, saline seep, or other miscellaneous wetland.
  - Riverine: river or stream channel.

- The National Hydrography Dataset (USGS and EPA 1999), which identifies the approximate locations and types of rivers, streams, canals, and ditches in each watershed. In maps and tables, this dataset is divided into natural features (streams/rivers) and man-made or altered features (canals/ditches). Results from this dataset were used to calculate linear feet of these feature types.

- The Holland Central Valley Vernal Pool Complexes data layer (Holland 2009b), which identifies vernal pool landscapes (not vernal pool areas). These data are presented as acres of vernal pool communities, which include both upland and aquatic habitats. The acreage associated with the data is often significantly greater than the actual area of aquatic features present within a given area.

A combination of the land use and the aquatic feature databases was used to provide a profile for each of the watersheds that intersect the Fresno to Bakersfield alternative alignments. The Level 1 Watershed Profile lists (1) the types of aquatic features; (2) the extent or amount of each aquatic feature within a watershed; and (3) the relative condition of the aquatic features within each of the watersheds. Because of the significant variation in topography, soil, vegetation, and land uses in the watersheds crossed by the alternative alignments, the types, extent, and conditions vary greatly. To provide a meaningful analysis of the watershed profile as it relates to the context of the alternative alignments, the watershed profile was divided into ecological sections based on the USDA's ecological subregions (USDA 2007).

Both the types and the extent of the aquatic features present in each watershed were generated directly from the aquatic feature databases. The extents of some aquatic features are represented as polygons, which translate into areas (acreages), and other features, typically those that are linear, are represented as line features, which translate into linear feet. In a few instances, aquatic features from one database overlap with features from another database. In these cases, feature types were selectively removed from all but one of the databases based on a detailed review. This process made possible the development of a more robust dataset.

The assessment of the condition of an aquatic feature in a watershed is based on the location of the aquatic feature within a given land use type. The ecological condition of the aquatic feature is categorized as either poor, fair, or good based on the land use type and land use intensity in the area surrounding the aquatic feature. A water feature in relatively undisturbed (natural) land is given a condition of *good*. A feature in a low-intensity agriculture area is considered fair, and a feature in a high-intensity agriculture/developed land area is considered to have a condition of *poor*. The land use types are as follows:

- Aquatic features in high-intensity land use cover types (e.g., orchard and vineyard, croplands, urban,) are subject to a number of significant man-induced alterations, inputs, and constraints and are typically in poor ecological condition. High-intensity land uses:
  - Provide limited or no buffers to aquatic resources.
  - Often control or significantly alter the natural hydrology.
  - Have limited wildlife and biological value.
  - Often remove the physical structure of aquatic features and often include man-made features.
- Aquatic features in low-intensity land use cover types (e.g., barren) are subject to few man-induced alterations, inputs, and constraints and are typically in fair ecological condition. Low-intensity land uses:
  - Provide some buffers to aquatic resources.
  - May mildly to significantly alter the natural hydrology.
  - Have some wildlife and biological value.
  - Often retain the natural physical structure of aquatic features, though some characteristics may be removed or altered.
- Aquatic features in natural land use cover types (e.g., annual grassland, alkali desert scrub, blue oak woodland) are generally subject to minor man-induced alterations, inputs, and constraints and are typically in good ecological condition. Natural land uses:
  - Provide important buffers to aquatic resources.
  - Typically have natural or near-natural hydrology, though upstream or downstream land uses may affect aquatic features.

- Have considerable wildlife and biological value.
- Retain natural physical structure, though historical land use practices have reduced or altered some of the natural characteristics.

In general, these databases may over- or underestimate the extent of natural aquatic features in urban or agricultural regions; these regions are subject to constant manipulation, and even though the data presented are relatively current, the data may not reflect present-day conditions. Maps showing the aquatic features and land use types were generated for each watershed from the information in these databases. Charts were also created; the charts describe the quality and distribution of the aquatic features in each watershed by ecological section. Each chart uses linear feet to show the distribution of the rivers, streams, canals, and ditches and acres to show lakes, ponds, and wetlands. In addition, for each watershed, a table presents the breakdown of each type of aquatic feature, its presumed quality, and its size by ecological section.

3.2 Methodology: Existing Conditions

This section describes the methods used to identify the existing conditions of the aquatic resources in the study area. The condition of aquatic resources is one of the components analyzed as part of the Section 404(b)(1) alternatives analysis and is required as set forth in the MOU (the requirement to conduct a "detailed (rapid assessment or better) assessment of the functions and services of special aquatic sites and other waters of the U.S.") (EPA et al. 2010). The existing conditions can be used to establish the baseline from which project impacts are analyzed and assist in the identification of compensatory mitigation requirements.

The condition of the aquatic resources in the study area was established using a two-step process: (1) the CRAM assessment and (2) extrapolation of the CRAM assessment results to provide relative condition values. In the first step, the conditions of a representative sample of aquatic features were assessed using CRAM. CRAM works by scoring metrics that are part of four key attributes: landscape and buffer, hydrology, physical structure, and biotic structure. To the extent possible, CRAM methodology, as described in the CRAM User's Manual, Version 5.0.2 (CWMW 2008), Version 6.0 (CWMW 2012), and corresponding module field books, was followed. A complete description of the field methodology is provided in the CRAM report (Appendix A). In the CRAM approach, aquatic resources are scored from 25 (poor) to 100 (ideal).

In areas where permission to enter had been granted, CRAM was conducted on the various types of aquatic resources present in the study area. In areas where permission to enter had not been granted, it was not possible to obtain field-assessed CRAM condition scores for all aquatic features present in the study area. Rather, the CRAM assessment attempted to assess a representative sample of aquatic feature types within the confines of areas where permission to enter had been granted. Where permission to enter was allowed, the CRAM assessment made use at least five sample assessment areas for each type of aquatic resource (canal, ditch, vernal pool, and seasonal riverine).

A CRAM-certified trainer, Chad Roberts, Ph.D. (CRAM coordinator), of Roberts Environmental and Conservation Planning, provided oversight and guidance, and both the CRAM coordinator and URS/HMM/Arup Joint Venture staff conducted the CRAM field work. Field staff used best professional judgment, as informed by direction from the CRAM coordinator and consultation with the USACE and EPA, in using CRAM.

In the second step, the results from the CRAM assessment were extrapolated to provide relative condition values for all aquatic resources in the study area. The extrapolation process started by converting the CRAM scores to the qualitative condition values of poor, fair, good, or excellent (Table 3-1). The range of CRAM scores identified in the field for each sampled aquatic resource

type was calculated and converted to a relative condition indication (poor, fair, good, or excellent) for those resource types.

Table 3-1
CRAM Scores as They Relate to Relative Condition

CRAM Score Range	Relative Condition	Types of Aquatic Features
81–100	Excellent	—[1]
62–80	Good	Seasonal riverine, vernal pool
44–61	Fair	Ditch, seasonal wetland
25–43	Poor	Canal, retention/detention basin

[1] Individual vernal pool and vernal pool system CRAM scores fell into the excellent relative condition category. However, the average vernal pool score corresponded to a good relative condition.

CRAM = California Rapid Assessment Method

The relative condition for all aquatic features of a particular type was combined with other existing information (e.g., land use and wildlife habitat mapping) and used to inform and extrapolate conditions for all aquatic features. The extrapolation of conditions is important to qualify the conditions for aquatic resources where permission to enter was not granted. For example, the range of CRAM scores of retention/detention basins was between 31.6 and 51.5 (poor to fair) and similar features (other retention/detention basins) found in a similar landscape context (agriculture) were assigned the same relative condition (poor or fair). The range of the CRAM scores for the feature type, along with aerial photographic interpretation and other factors, including feature type, watershed, and proximity to stressors, were also considered in extrapolating condition scores. Although such extrapolations are inherently limited, they provide meaningful information and assistance in understanding the abundance and relative condition of aquatic resources that may be affected by the project.

3.3 Methodology: Impact Calculations

This section describes the methods used to evaluate impacts on aquatic features, special aquatic features, and terrestrial habitats. Four types of impacts are analyzed: direct-permanent, direct-temporary, indirect-bisected, and indirect. Direct impacts were calculated for all aquatic features present in both the construction and the project footprints. Indirect impacts were calculated for all aquatic features present within the 250-feet study area surrounding the construction and project footprints.

The extents (quantity: area) of the aquatic features affected by the project were calculated using a GIS model in which the mapped aquatic features as presented in the *Fresno to Bakersfield Section: Supplemental Preliminary Jurisdictional Waters and Wetlands Delineation Report* (Authority and FRA 2012g) were overlaid on the construction and project footprints. The footprints include all the infrastructure and construction areas that would be needed to build and operate the Fresno and Bakersfield Section of the HST System. In general, temporary impacts are those associated with construction activities (laydown and storage areas) and utility relocations in the construction footprint; permanent impacts are associated with permanent infrastructure, including the right-of-way for the HST tracks, the stations, the road overcrossings, the electrical facilities, and the heavy maintenance facility site alternatives.

The output of the GIS model included calculations of the acres of aquatic features directly and indirectly affected by the project. Schematic drawings that represent the types of footprint

features and the four types of impacts (direct-permanent, direct-temporary, indirect-bisected, and indirect) are provided in Appendix B. These types of impacts are described in more detail below.

3.3.1.1 Direct Impacts

Direct impacts are impacts to all aquatic features or portions of aquatic features within the construction and project footprints. Direct impacts result from filling existing aquatic features or excavating soils of aquatic features, thereby removing all or a portion of those features. For aquatic features that are partially present in the construction or project footprint, only the portion within the footprint is considered directly affected. Direct impacts are classified into either permanent or temporary impacts.

Permanent and temporary impacts are largely distinguished by the purpose of the disturbance and whether the impact occurs solely for the construction phase or would result in a permanent or long-term disturbance of the resource. For example, temporary impacts are associated with construction staging areas and underground utility relocation efforts, whereas permanent impacts result from the construction of the HST tracks, stations, and associated infrastructure (e.g., road overcrossings, electrical facilities). For vernal pool and swale features that straddle the footprint, the portion of the feature within the footprint would be considered to be directly affected. The portion of the feature outside the construction footprint would be said to undergo an "indirect-bisected" impact.

Direct-Permanent Impacts

Direct-permanent impacts occur to all aquatic features present within the project footprint of permanent construction elements. Permanent project footprint elements include:

- BNSF yard relocation.
- Canal relocation.
- Drainage basins.
- Freight rail relocation.
- Heavy maintenance facility sites.
- Train track (at-grade, elevated, and below-grade).
- Pedestrian bridges.
- Road closures.
- Roadways (including underpasses).
- Train stations.
- Traction power sub-stations.

Most of these construction elements would result in the permanent filling of aquatic features in the project footprint associated each element. However, elevated train track, which includes bridges, would be an exception because these structures would only require fill within a limited portion of the footprint, where supports and pilings are located. Outside of the limited area of fill, aquatic features spanned by elevated track or bridges would potentially be degraded but would not be permanently filled. However, to provide a conservative estimate of aquatic resource impacts, the portion of the footprint beneath the viaduct or elevated track structure is considered to be permanently impacted.

Direct-Temporary Impacts

Direct-temporary impacts can occur to aquatic features present within the footprint of temporary construction elements. Temporary construction footprint elements include:

- Construction staging areas.
- Natural gas line relocation.
- Petroleum line relocation.
- Removal of base and surfacing.
- Removal of bridge.
- Temporary construction easement.
- Transmission line relocation.
- Utility easement.

The duration of the direct-temporary construction elements varies from months to years. The disturbances associated with utility relocations are anticipated to be relatively short in duration, but the disturbances associated with construction staging areas may be longer in duration (e.g., 5 years). Aquatic resources subjected to direct-temporary impacts will be restored to their pre-project condition after the completion of construction.

3.3.1.2 Indirect Impacts

Indirect impacts to aquatic features would occur within 250 feet of the construction and project footprints. Indirect impacts would not overlap with direct impacts. Indirect impacts would occur due to the alterations in hydrology and soil that result from adjacent direct impacts associated with construction and project activities. Adjacent direct impacts may indirectly result in changes in the hydrology of an aquatic feature by reducing, increasing, or diverting the flow of its water source. Indirect impacts are not subject to dredging or discharge of fill material and are not subject to construction or project encroachment. For calculating the acres of indirect impacts to aquatic features, two possible impact levels were applied to the GIS model: indirect-bisected and indirect.

Indirect-Bisected Impacts

This impact type only occurs to vernal pools and vernal swales and reflects their sensitivity to disturbance. These vernal features are particularly sensitive to soil disturbance. In instances where a vernal feature straddles the construction or project footprints, direct impacts to the feature may result in significant disturbance to the feature. The indirect-bisected category was developed to track these potentially significant indirect impacts. Other aquatic resources present in the 250-foot area beyond the construction footprint (man-made features and seasonal riverine features) are not as sensitive to indirect impacts and therefore are not calculated in this manner.

Therefore, for vernal features that cross into the construction or project footprint, only the portion of the vernal pool outside the footprint is considered to be subject to indirect-bisected impacts. Any portion of the vernal feature that occurs inside the footprint is defined as a direct impact. Impacts to vernal features located entirely within the study area but outside the footprint are identified and quantified as an indirect impact.

Indirect Impacts

Indirect impacts to aquatic features are quantified based on the extent and type of aquatic feature present within 250 feet of the construction and project footprints. For features that extend into the construction and project footprints, only the portion of the feature outside of the footprint is categorized as being subject to an indirect impact. The portion of the aquatic feature inside the construction and project footprints is categorized as a direct impact (either direct-

permanent or direct-temporary). However, for vernal pools, vernal swales, and vernal pool and swale complexes, if the vernal feature extends into the construction and project footprints, the indirect impact is categorized as an indirect-bisected impact (see above). Indirect impacts to vernal pools are quantified as—and only include—those vernal features that are entirely outside of the construction and project footprints.

3.4 Methodology: Post-Project Conditions

The post-project conditions of aquatic resources in and adjacent to the construction and project footprints were estimated using a set of projections generated for the project. These projections considered the type of aquatic feature (man-made or natural), the type of impact (direct or indirect), and the relative condition (poor, fair, good, or excellent). The post-project condition assessment is important to identify the net aquatic functions and services lost within each watershed or by each project alternative, so that decisions can be made in terms of understanding the mitigation obligation to achieve "no net loss" of aquatic functions and services (or conditions).

The results of the relative condition assessment (described above) indicate that a set of projections was generated for direct impacts and for indirect impacts. After the application of the projections, wetland scientists reviewed the results and used best professional judgment to make minor modifications on a feature-by-feature basis. Modifications to impacts and post-project condition were made to features separated from the construction and project footprints by the existing BNSF railroad tracks. The BNSF railroad provides a buffer to those aquatic features to the east from the effects of the HST project because the footprint of the HST project is west of the existing BNSF railroad tracks. Therefore, the indirect impacts were modified to "low" for such features as seasonal wetlands and vernal pools and swales, that otherwise would have been considered moderately affected by the project.

3.4.1.1 Direct Impacts

For post-project conditions resulting from direct impacts, the projections were largely based on the construction or project element. The post-project condition assessment includes the implementation of the proposed mitigation measures identified in the *Fresno to Bakersfield Section: Revised Draft EIR / Supplemental Draft EIS* that would restore direct-temporary impacts and some direct-permanent impacts. Under direct impacts, three post-project condition outcomes where identified: (1) the feature is no longer present; (2) the feature has a reduced condition from its existing condition; or (3) the feature does not change from its existing pre-construction condition. A summary of the projections used to generate the post-project conditions associated with direct impacts on aquatic resources is provided in Table 3-2.

Table 3-2
Summary of Post-Project Condition of Aquatic Resources: Direct Impacts

Construction Element	Type of Direct Impact	Man-Made Aquatic Resources [a]	Natural Aquatic Resources [b]
BNSF yard relocation	Permanent	Does not exist	Does not exist
Canal relocation	Permanent	Does not exist	Does not exist
Construction area	Temporary	No change	Reduced condition
Drainage basin	Permanent	Does not exist	Does not exist
Freight rail relocation	Permanent	Does not exist	Does not exist

Table 3-2
Summary of Post-Project Condition of Aquatic Resources: Direct Impacts

Construction Element	Type of Direct Impact	Man-Made Aquatic Resources [a]	Natural Aquatic Resources [b]
Heavy maintenance facility	Permanent	Does not exist	Does not exist
HST track			
At-grade	Permanent	Does not exist	Does not exist
Elevated	Permanent	No change	Reduced condition
Below-grade	Permanent	Does not exist	Does not exist
Pedestrian bridge	Permanent	Does not exist	Does not exist
Roadway work (closures, overpasses, and underpasses)	Permanent	Does not exist	Does not exist
Stations	Permanent	Does not exist	Does not exist
Traction power sub-station	Permanent	Does not exist	Does not exist
Utility line relocation (natural gas, petroleum, and transmission line relocation)	Temporary	No change	Reduced Condition

[a] Man-made aquatic resources include canals, ditches, emergent wetlands, reservoirs, and retention/detention basins.
[b] Natural aquatic resources include seasonal riverine features, seasonal wetlands, vernal pools, and vernal swales.

Direct-Permanent Impacts

For most direct-permanent impacts, the post-project condition of aquatic resources is that the feature is no longer present. Aquatic features will not long be present when HST tracks are constructed at-grade and where impacts are associated with other HST facilities and infrastructure. However, aquatic features in areas where the HST track would be constructed on an elevated structure may retain some of their existing functions and services (or conditions). For example, seasonal riverine, canals, or ditches below an elevated structure would likely retain some of their existing functions and services (conditions). However, for sensitive features such as vernal pools, the post-project condition would be that the feature is completely lost (no longer present).

Direct-Temporary Impacts

For all direct-temporary impacts, the post-project condition results in either no net change in feature condition or reduced relative condition, depending on the type of aquatic feature. Man-made features (canals, ditches, retention/detention basins, emergent wetland, and reservoirs) that are already highly manipulated and generally have low existing condition values can and will be restored to their pre-project condition after the completion of temporary construction activities and the implementation of project restoration measures. Therefore, direct-temporary impacts will result in no change in these features. Seasonal riverine, riparian areas, and seasonal wetland features are more sensitive to disturbance and are difficult to replace due to alterations in hydrology, soil, and/or vegetation that would occur as a result of the project. Such alterations are expected to reduce the condition of these features from their existing condition. Because it is difficult to restore vernal pools to pre-project conditions after they are temporarily affected, all impacts on vernal pools are considered permanent and would therefore cause those vernal pools to no longer exist.

3.4.1.2 Indirect Impacts

Although no direct impacts would occur in—or fill material would be placed in—aquatic resources that occur outside of construction and project footprints (area of direct impacts), aquatic features in the 250-foot buffer could be indirectly affected due to the proximity of these resources to the direct impacts and the effects that direct impacts would have on the surrounding landscape, hydrology, and physical and biological conditions. For calculating the post-project conditions of aquatic features that are indirectly affected, three possible indirect impact levels (risk) were applied to the GIS model: high, moderate, and low. Post-project conditions were calculated based on the risk of indirect impacts and type of aquatic resource. A summary of the projections used to identify the risk of adverse indirect impacts on aquatic resources is provided in Table 3-3.

Table 3-3
Summary of Risk Assessment for Aquatic Resources: Indirect Impacts

Type of Aquatic Resource	Man-Made or Natural	Type of Indirect Impact	Risk of Indirect Impacts	Post-Project Condition	Notes
Canals/ditches	Man-made	Indirect	Low	Same as existing condition	Highly manipulated
Emergent wetland	Man-made	Indirect	Low	Same as existing condition	Most features highly manipulated.
Lacustrine	Man-made	Indirect	Low	Same as existing condition	Highly manipulated
Riparian (not USACE jurisdictional)	Natural	Indirect	Moderate	Same as existing condition / reduced by one condition class	Features tied directly to seasonal riverine impacts. Post-project condition is the same as existing condition for features that have a poor existing condition.
Seasonal riverine	Natural	Indirect	Moderate	Same as existing condition / reduced by one condition class	Post-project condition is the same as existing condition for features that have a poor existing condition.
Seasonal wetland	Natural	Indirect	Low/moderate	Same as existing condition / reduced by one condition class	Some features Low risk. Post-project condition is the same as existing condition for features that have a poor existing condition.
Vernal pools and vernal swales	Natural	Indirect	Low	Reduced by one condition class	Applies to vernal pools east of BNSF
	Natural	Indirect	Moderate	Same as existing condition / reduced by one condition class	Post-project condition is the same as existing condition for features that have a poor existing condition.
	Natural	Indirect-bisected	High	Reduced to poor condition	Abutting direct impact

Because the functions and services (conditions) of man-made aquatic features are already low due to a number of existing stressors, additional HST-induced impacts are not expected to result in any significant overall change in the quality of these features. Therefore, canals/ditches, emergent wetland, and lacustrine features are subject to low indirect impacts. These resources have a low risk of being converted to another wetland type or being reduced in functions and services (or conditions). Their post-project condition is expected to remain the same as their existing condition. Because the majority of man-made aquatic features have a poor existing condition, their post-project condition resulting from low risk indirect impacts will also be poor. For man-made or manipulated features with fair or good existing conditions (as applies to emergent wetland), their post-project condition will remain fair or good because the risk to change is low.

Because seasonal riverine, riparian, and seasonal wetlands are more sensitive to indirect alterations to hydrology and landscape, indirect impacts to these aquatic feature types are generally projected to be moderate. The resulting post-project condition for these features is expected to be reduced by one condition class, unless the existing condition is poor, in which case, the condition does not change. For example, most seasonal riverine features have an existing condition of good, so moderate indirect impacts to these features would result in a post-project condition of fair. For seasonal wetlands east of the existing BNSF railroad tracks, the risk of indirect impacts is expected to be low, due to the buffer the tracks provide from construction and project impacts. The post-project condition of these features would remain the same as their existing condition, which is generally fair.

Because of the ecological sensitivity of organisms and processes in vernal pools and vernal swales, the risks associated with adverse indirect impacts are projected to be high or moderate. The difference between moderate and high risk indirect impacts is based on the proximity and location of the impact in relation to direct impacts. For vernal features that are bisected by the project footprint (with indirect-bisected impacts) and abut direct impacts, the risk of being converted to another aquatic resource type (seasonal wetland or not present) is high. The resulting post-project condition of these features, regardless of existing condition, is assumed to be poor. Vernal pool features that are entirely outside of the construction and project footprints on an at-grade profile are at moderate risk. The post-project condition of these vernal pool features would be reduced by one condition class. For vernal pools with an existing condition of good, the moderate risk associated with indirect impacts would result in a post-project condition of fair. For vernal pool features on the east side of the existing BNSF railroad tracks and outside the construction and project footprints, the risk of indirect impacts is low. Therefore, the post-project condition of these vernal pool features would remain the same as their existing condition, which is either good or fair.

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Section 4.0
Environmental Setting

4.0 Environmental Setting

This section discusses the physical and biological conditions identified during pre-field investigations, reconnaissance-level surveys, and field surveys in the study area.

The Fresno to Bakersfield Section of the HST System is in in the San Joaquin Valley of California. In general, it parallels the existing BNSF Railway tracks and State Route (SR) 43. The study area is west of SR 99 and east of Interstate 5. The alignment trends in an overall northwest to southeast direction for approximately 118 miles with a minimum study area width of 250 feet. The study area crosses a number of major rivers, canals, agricultural ditches, smaller creeks, and ephemeral drainages and is primarily composed of agricultural lands, urban and rural communities, and scattered fragments of undeveloped natural habitat. The following sections provide a general overview of the physical conditions (e.g., geological setting, climate, watershed, hydrology, soils) and biological conditions (e.g., terrestrial habitats and land uses, aquatic resources and special areas, conservation areas).

4.1 Physical Conditions

The existing physical conditions pertinent to the Watershed Evaluation Report include physiography and regional geologic setting, climate, watershed, hydrology, and soils. Five ecological sections are represented in the Tulare Lake Basin, as shown on Figure 4-1. They are the Sierra Nevada Ecological Section, the Sierra Nevada Foothills Ecological Section, the Great Valley Ecological Section, the Central California Coast Ranges Ecological Section, and the Southern California Mountain and Valley Ecological Section. The Fresno to Bakersfield Section alternative alignments lay entirely within the Great Valley Ecological Section; the alternatives are bordered by the Sierra Nevada and Sierra Nevada Foothills ecological sections to the east, the Central California Coastal Ranges (Coast Ranges) Ecological Section to the west, and the Southern California Mountain and Valley (Mountain and Valley) Ecological Section to the south.

4.1.1 Physiography and Regional Geologic Setting

The project is in the Central Valley of California, which is in the Great Valley Geomorphic and Physiographic Province (CGS 2002). The Central Valley is a large, nearly flat valley bound by the Klamath and Trinity mountains to the north, the southern Cascade Range and the Sierra Nevada to the east, the San Emigdio and Tehachapi mountains to the south, and the Coast Ranges and San Francisco Bay to the west. The Central Valley consists of the Sacramento Valley in the north and the San Joaquin Valley in the south.

The Central Valley occupies a structural trough created about 65 million years ago by the collision of the Pacific and North American tectonic plates. Sediment from ocean water, river deposition, and glacial deposition filled the trough with an approximately 6-mile-thick layer of continental and marine sediments above rock (Authority and FRA 2004).

The study area is in the central part of the San Joaquin Valley. The topography in this part of the Central Valley is flat-lying, with elevations across the project alternatives and the HMF site alternatives ranging from +395 feet (North American Vertical Datum of 1988) to +205 feet (North American Vertical Datum of 1988). A general downward gradient occurs in the study area to the west-southwest, determined principally by the gentle slope of the vast alluvial fans extending from the Sierra Nevada in the east to the center of the San Joaquin Valley.

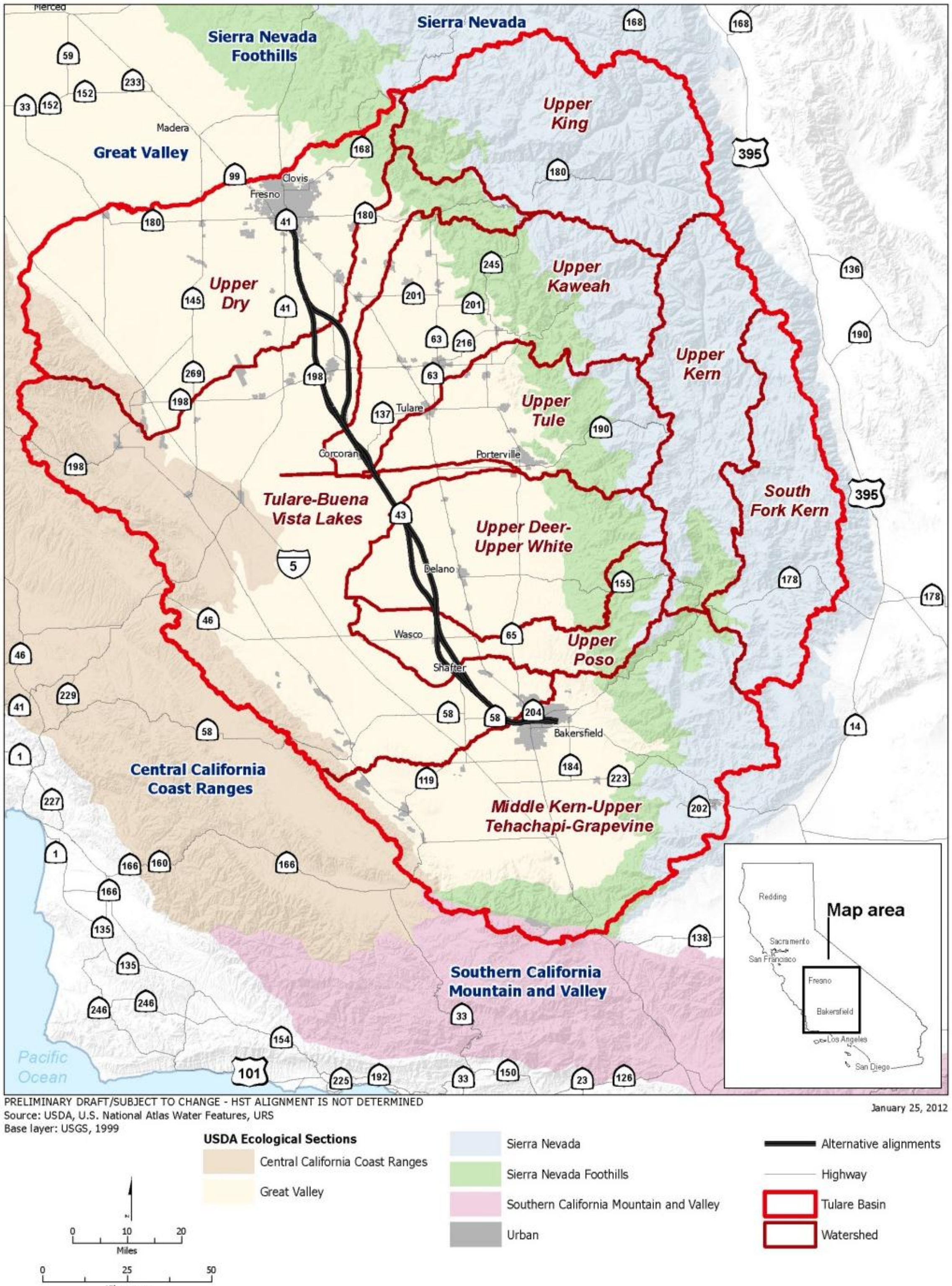


Figure 4-1
Tulare Lake Basin ecological sections and watersheds

4.1.2 Climate

The climate within the study region is semi-arid, with long, hot, dry summers and relatively mild winters. Heavy rainfall and snow in the western Sierra Nevada are the major sources of water in the Tulare Lake Basin (Gronberg et al. 1998). As determined from the long-term records of precipitation, the average annual precipitation in the study region ranges from approximately 6.23 to 10.94 inches. More than 80% of the precipitation in the study area occurs from November through April. In the Sierra Nevada, the majority of the mean annual precipitation falls as snow and ranges from 20 inches in the foothills to over 80 inches at higher elevations. The annual precipitation in the Coast Ranges, west of the valley floor, ranges from 10 to more than 20 inches (Gronberg et al. 1998).

4.1.3 Watershed

The Fresno to Bakersfield Section of the HST system lies in the southern portion of California's San Joaquin Valley, within the Tulare Lake Basin (Figure 4-1). The Tulare Lake Basin is approximately 16,400 square miles and mostly spans Fresno, Kings, Tulare, and Kern counties (CVRWQCB 2004). The Tulare Lake Basin is drained by the Kings, Kaweah, Tule, and Kern rivers, which flow to the dry beds of Tulare, Buena Vista, and Kern lakes. The Fresno to Bakersfield Section occurs within seven HUC-8 watersheds in the Tulare Lake Basin (Figure 4-2):

- Upper Dry Watershed (18030009)
- Tulare–Buena Vista Lakes Watershed (18030012)
- Upper Kaweah Watershed (18030007)
- Upper Tule Watershed (18030006)
- Upper Deer–Upper White Watershed (18030005)
- Upper Poso Watershed (1803004)
- Middle Kern–Upper Tehachapi–Grapevine Watershed (1803003)

Before agricultural development, the Tulare Lake Basin was dominated by four large, shallow, and mainly temporary inland lakes (Gronberg et al. 1998). The Tulare Lake bed, which was the most northerly lake of the four, has been turned into a system of approximately 103 miles of levees and irrigation canals to direct flooding away from farmed tracts of land (USACE 1996). The Kern River once flowed south and west across the southern portion of the valley through a complex system of sloughs, creeks, ponds, and permanent wetlands and fed Buena Vista and Kern lakes.

To convey water for agricultural purposes, many watercourses are highly altered from their natural state. Farmers and other agricultural producers pump groundwater and surface water to and from the numerous canals and drains that deliver irrigation water to and from agricultural fields. Composed of packed earth or concrete lining, the canals generally lack the meanders, vegetation, biota, and other features of natural streams.

The California Aqueduct and Friant-Kern Canal are major water conveyance systems that cross the study region. The California Aqueduct, which is approximately 30 miles west of the alternative alignments, was constructed in the 1970s and supplies agricultural and municipal areas in Southern California. The California Aqueduct generally runs north to south.

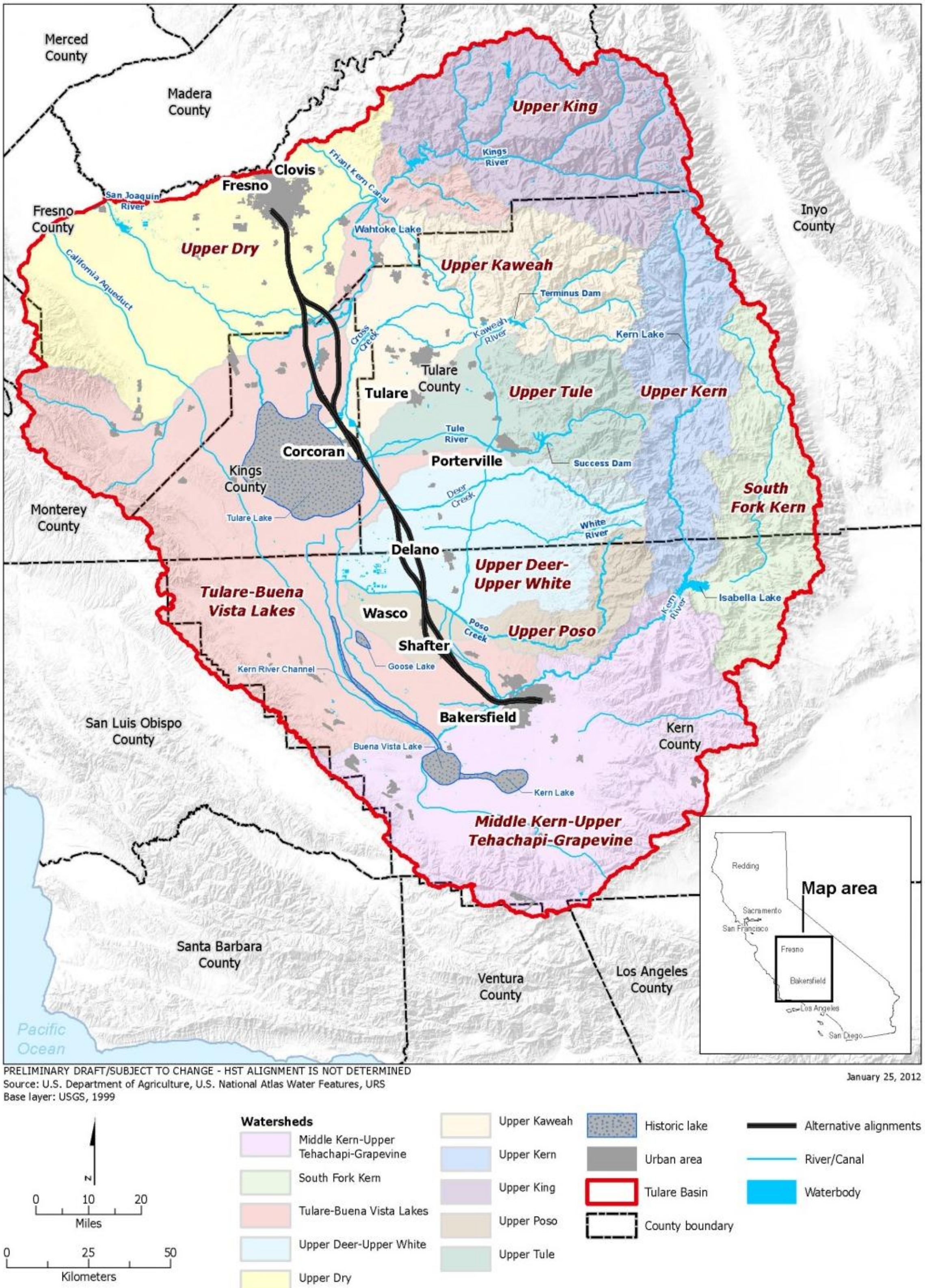


Figure 4-2
Tulare Lake Basin watersheds

The Friant-Kern Canal transports water south from Millerton Lake, a reservoir north of Fresno created by Friant Dam, and joins the Kern River approximately 4 miles west of Bakersfield. The 152-mile-long Friant-Kern Canal is east of the alternative alignments. The canal capacity near Millerton Lake is 5,000 cubic feet per second (cfs) but decreases to 2,000 cfs in the southern portion of the valley as water is diverted for municipal, industrial, and agricultural use (ICF Jones & Stokes 2008). With the consent of the U.S. Bureau of Reclamation, Kaweah River water is occasionally pumped to the canal to relieve downstream flooding in the Tulare Lake bed. When the canal is full or downstream demand is low, the Friant-Kern Canal may not be used for flood control purposes (USACE 1996).

4.1.4 Hydrology

Of all the precipitation that falls within the Tulare Lake Basin, most of the runoff (over 98%) is collected in the Sierra Nevada and ends up within the Kings, Kaweah, Tule, and Kern rivers (Figure 4-3). The remaining runoff contributes to stream flows, including Deer Creek, White River, and Poso Creek. Hydrologically, the Tulare Lake Basin is essentially closed, because water only drains north to the San Joaquin River during periods of extremely high rainfall. The contributing rivers are normally dewatered (for agricultural uses) before reaching the Great Valley floor (USDA 1982).

4.1.4.1 Historical Hydrology

Historically, the Tulare Lake Basin was dominated by four large, shallow, mainly seasonal, terminal lakes: Tulare, Buena Vista, Goose, and Kern lakes (Figure 4-3). Historical Tulare Lake was originally one of the largest lakes in California, occupying much of southern Kings and Tulare counties and northern Kern County and encompassing up to 790 square miles during the wettest years (USDA 1986; EPA 2007). Tulare Lake was historically fed by the Kings River, Kaweah River (the source of Poso Creek), Tule River, and the Kern River from the Sierra Nevada. It was a terminal lake, having no natural outlet in dry years and overflowing to reach the San Joaquin River periodically during wet years (USDA 1982).

Buena Vista and Kern lakes were fed by the Kern River, which once flowed south and west across the southern Central Valley through a complex system of sloughs, creeks, ponds, and permanent wetlands. Goose Lake was fed by the overflow of a Kern River distributary and the overflow of Buena Vista Lake. In particularly wet years, Buena Vista Lake would overflow into the Buena Vista Slough, ultimately feeding into Tulare Lake (EPA 2007). Evaporation of these historic lakes through water diversions and climate change has resulted in a wide area of saline-sodic soils on the southern Central Valley floor. These soils support plants and plant communities tolerant of the saline and alkaline conditions.

Large portions of the southern Central Valley floor were historically subject to frequent flood events, from either intense fall/winter rainfall or from late-spring/early-summer snowmelt originating in the Sierra Nevada.

4.1.4.2 Present-Day Hydrology

The Tulare Lake Basin has changed dramatically in the past 150 years. Although many of the headwaters and mountains of the southern Sierra Nevada and the Coast Ranges have been protected, the effects of urbanization and human use increase toward the valley floor. All four of the major rivers have been dammed and much of the water flowing into the basin is diverted by numerous irrigation canals for agricultural use. The level of conversion has been so significant that Tulare Lake no longer exists; its bottom was reclaimed for farming and its water diverted.

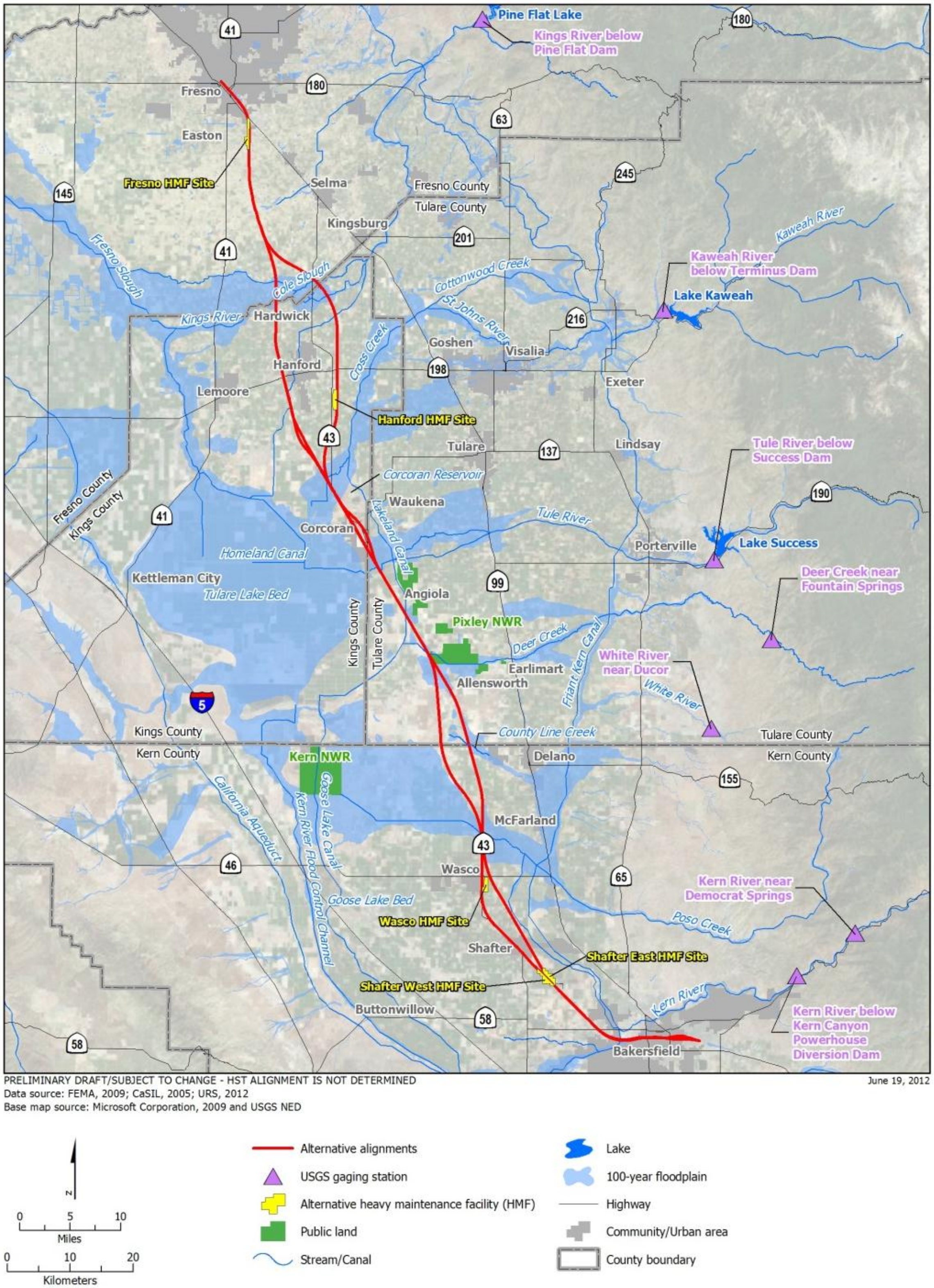


Figure 4-3
Floodplains and hydrology

The southern Central Valley once sustained rich riparian wetland habitats and shallow groundwater in the deltas of the major rivers (USDA 1982), but most of these habitats and the shallow groundwater are now greatly reduced or eliminated. More than 88% of wetlands and over 95% of the oak woodlands in the southern Central Valley have been converted to agriculture or urban use (Kelly et al. 2005). Much of the agriculture is supplied in the basin by the Friant-Kern Canal. This component of the federal Central Valley Project was built in the late 1940s (USDI Bureau of Reclamation 2011). This water conveyance system runs north-south through the eastern side of the basin, intersecting with all of the major rivers and creeks. The canal supplies water from the north to the drier southern areas. In high-water years, surplus flows are pumped into the Friant-Kern Canal to minimize flood risk (EPA 2007). The California Aqueduct runs through the western side of the Tulare Basin. This system delivers water from the state's California Water Project and the federal Central Valley Project (the water is diverted in the Sacramento–San Joaquin Delta directly to water consumers in the southern Central Valley and Southern California).

The water flowing into the valley floor provides critical beneficial uses, primarily irrigation for agriculture. California's Department of Water Resources estimates that about 84% of the water in the Tulare Lake region is used for agriculture, 5% is used for urban uses, and the remaining 11% is available for environmental uses, including wildlife and fish habitat (DWR 2005).

Regular flooding is now largely controlled by dams, diversions, levees, and dredging. The previous floodplain and riparian habitat have also largely been replaced by agriculture or urban development. Infrequent but catastrophic floods now occur in parts of the southern Central Valley; these floods are made more severe by the loss of the flood-attenuating functions of riparian and wetland habitats (USDA 1982; Vileisis 1997).

At the project level, all of the streams and rivers within the Fresno to Bakersfield alternative alignments have been dredged, culverted, diverted, dewatered, channelized, or have had their active floodplains severely reduced by levee construction. Therefore, most of the surface water in the project footprint is found in irrigation canals, ditches, or water retention/detention basins, and occasionally in river channels or in precipitation-fed wetlands and vernal pools. The remaining wetlands are largely unrelated to the historical floodplains or regional aquifers.

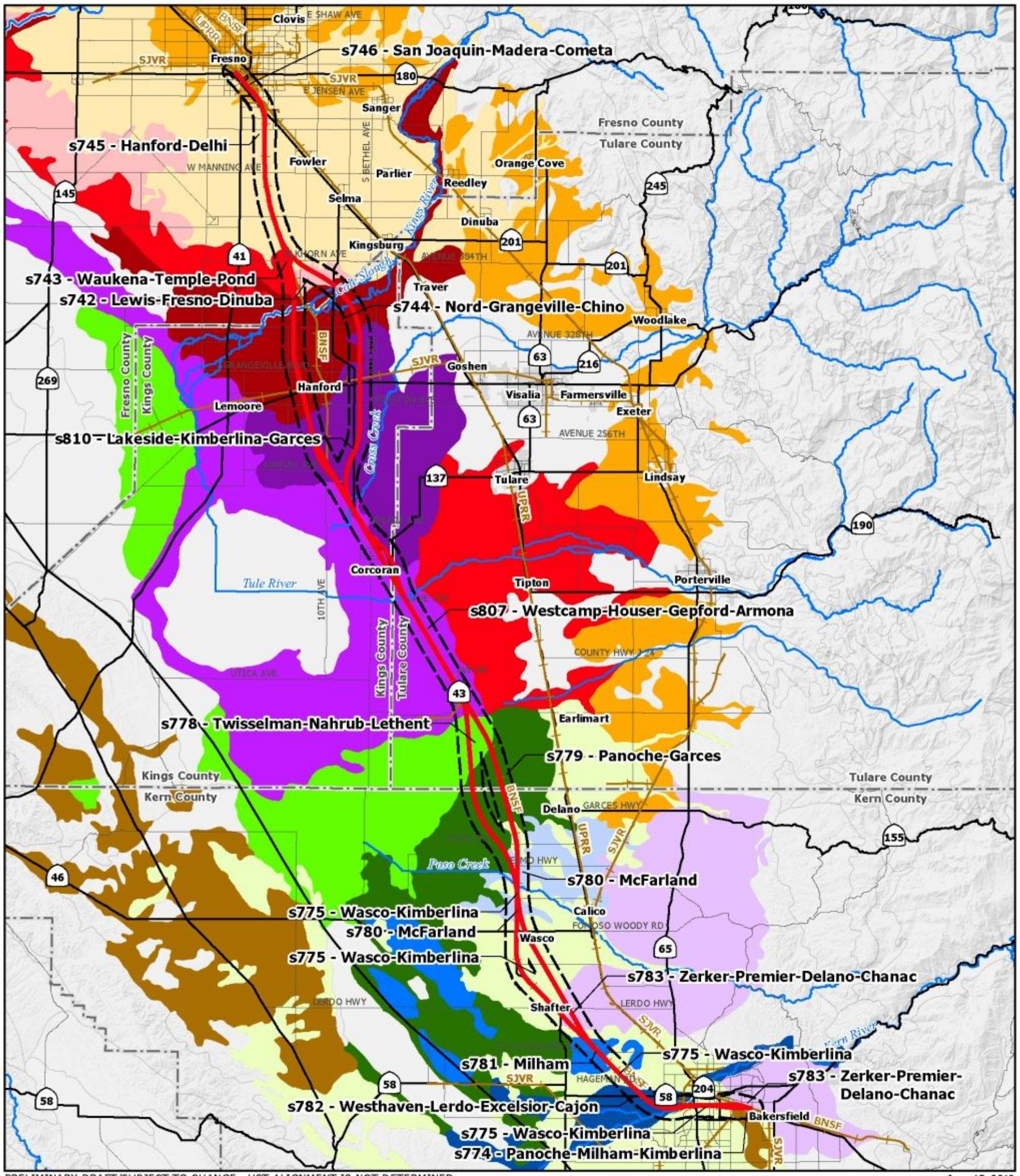
4.1.5 Soils

The soils underlying the project alternatives, the station alternatives, and the HMF alternatives are described in Natural Resources Conservation Service (NRCS) soil surveys; these soils consist primarily of alluvial deposits of clay, silt, sand, and gravel with varying grain sizes and content (USDA-NRCS 2006). The soil types and consistencies of these deposits vary by location and depend on how the soils were deposited. The surface soils in the project vicinity generally have high permeability and infiltrate runoff relatively quickly. This soils information is based on conditions within the upper 4 to 5 feet of the ground surface. Table 4-1 provides a summary of the physiographic features, soil associations, and counties of occurrence. Figure 4-4 shows the soil associations in the study area.

Table 4-1
Summary of Soil Associations

Soil Association	Counties of Occurrence	Landform Groups	Potential Soil Hazard Characterization
San Joaquin-Madera-Cometa	Fresno	Low alluvial terraces	No to moderate erosion potential; low to high shrink-swell potential; high corrosivity potential
Hanford-Delhi (also identified as Q_{sd} (sand dunes) on Figure 3.9-1 in the Revised Draft EIR / Supplemental Draft EIS)	Fresno	Young alluvial fans and alluvial benches,	No to slight water erosion potential; slight to moderate wind erosion potential; low shrink-swell potential; low corrosivity potential
Waukena-Temple-Pond	Fresno	Basin floodplain	No to slight water erosion potential; slight wind erosion potential; low to moderate shrink-swell potential; low to high corrosivity potential
Lewis-Fresno-Dinuba	Fresno	Alluvial fans/valley plains	No to slight erosion potential; low to moderate shrink-swell potential; high corrosivity potential
Nord-Grangeville-Chino	Fresno/Kings	Lower parts of recent alluvial fans and floodplains	No to slight erosion potential; low to moderate shrink-swell potential; low to high corrosivity potential
Lakeside-Kimberlina-Garces	Kings/Tulare	Alluvial fans	Slight water erosion potential; low to high shrink-swell potential; slight to moderate wind erosion potential
Westcamp-Houser-Gepford-Armona	Kings/Tulare	Low alluvial fans, basins, and floodplains	Slight wind erosion potential, moderate to high water erosion potential; low to high shrink-swell potential; high corrosivity potential
Twisselman-Nahrub-Lethent	Tulare	Basin rims and fan remnants	Moderate to high water erosion potential; moderate wind erosion potential; low to moderate shrink-swell potential; high corrosivity potential
Panoche-Garces	Tulare/Kern	Alluvial fans and floodplains	Slight water erosion potential; slight to moderate wind erosion potential; low to moderate shrink-swell potential
McFarland	Kern	Alluvial fans and floodplains	Slight water erosion potential; low to moderate shrink-swell potential; high corrosion potential to uncoated steel
Wasco-Kimberlina	Kern	Alluvial fans, fan skirts, and plains	Slight water erosion potential; low to moderate shrink-swell potential; low to high corrosivity potential
Zerker-Premier-Delano-Chanac	Kern	Alluvial plains and terraces	Low shrink-swell potential; low wind erosion potential
Milham	Kern	Alluvial fans	Low to moderate erosion potential; low to moderate shrink-swell potential
Westhaven-Lerdo-Excelsior-Cajon	Kern	Alluvial fans and fan skirts	Moderate to high erosion potential; slight wind erosion potential; low shrink-swell potential
Panoche-Milham-Kimberlina	Kern	Alluvial fans, plains, and low terraces	Local moderate water erosion potential; high corrosivity potential to uncoated steel

Source: USDA-NRCS 2006.
[a] As mapped by USDA-NRCS 2006. Refer to Figure 3.9-2 in the Revised Draft EIR / Supplemental Draft EIS for the locations of soil associations (Authority and FRA 2012a).



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HST ALIGNMENT IS NOT DETERMINED
Source: U.S. Department of Agriculture, Natural Resources Conservation Service, 2006
Note: Only soil within 1-mile buffer of alignments displayed in legend.

N

0 5 10 Miles
0 10 20 Kilometers

- Alternative alignments
- Existing rail line
- Major road
- Hydrographic feature
- Community/Urban area
- County boundary
- 1-mile buffer of alignment
- s742 - Lewis-Fresno-Dinuba
- s743 - Waukena-Temple-Pond
- s744 - Nord-Grangeville-Chino
- s745 - Hanford-Delhi
- s746 - San Joaquin-Madera-Cometa
- s774 - Panoche-Milham-Kimberlina
- s775 - Wasco-Kimberlina
- s778 - Twisselman-Nahrub-Lethent
- s779 - Panoche-Garces
- s780 - McFarland
- s781 - Milham
- s782 - Westhaven-Lerdo-Excelsior-Cajon
- s783 - Zerker-Premier-Delano-Chanac
- s807 - Westcamp-Houser-Gepford-Armona
- s810 - Lakeside-Kimberlina-Garces
- Soils outside of 1-mile buffer

Figure 4-4
Soil associations

The soils within the study area generally occur in one of the physiographic locations (Figure 4-5). The characteristics of the physiographic locations and the associated soils are summarized below:

- Alluvial fans and floodplains. These soils are found in Fresno, Kings, Tulare, and Kern counties. Alluvial fans are fan-shaped deposits of water-transported material (alluvium). They typically form at the base of topographic features where there is a marked break in slope. Consequently, alluvial fans tend to be coarse-grained, especially at their mouths where the energy of the stream or river is still high. At their edges, however, where energy levels can be low to quiescent, they can be relatively fine-grained. These soils are developed in nearly level and gently sloped ground conditions, along drainage ways, on alluvial fans, and on floodplains. Characteristics often vary greatly within short distances because the soils developed in compositionally variable stream deposits. Some areas may have compacted silt or sand or an iron-silica hardpan. Typically, these soils have little clay content, exhibit low to moderate shrink-swell potential, are moderately to highly corrosive to uncoated steel, and are slightly corrosive to concrete. These soils also have slight potential for water and wind erosion. Sand dunes have been identified in the area south of Fresno (see Figure 4-5).

- Low alluvial terraces. These soils are found in Fresno and Kern counties. They are often found in rolling topography and can include a strongly cemented or indurated hardpan in the subsoil. The hardpan can be composed of cemented silica or clay. These soils contain expansive clays, resulting in moderate to high shrink-swell potential. These soils are highly corrosive to uncoated steel and moderately corrosive to concrete. They can have a moderate potential for water erosion and a high potential for wind erosion.

- Basin areas (including saline-alkali basins). These soils are found primarily in Kings, Tulare, and the northern portion of Kern counties. The topography of these areas is nearly level or gently undulating. They have more clay content than fans and terraces, and nearly all have accumulations of salt and alkali due to poor drainage. Most of these soils have cemented lime-silica hardpans in the subsoil. These soils exhibit low to high shrink-swell potential, are highly corrosive to uncoated steel, and are moderately corrosive to concrete. They are also moderately to highly susceptible to water and wind erosion.

4.2 Biological Conditions

Historically, the Central Valley was characterized by California prairie, marshlands, valley oak savanna, and extensive riparian woodlands (Hickman 1993). Today, more than 80% of the Central Valley is covered by farms and ranches (USDA-NRCS 2006). Overall, the study area is highly disturbed and fragmented because of urban, agricultural, railroad, highway, and local road land cover types. In a few areas, native vegetation remains relatively undisturbed, though invasive and non-native plant species may occur in these areas. If these areas have not been recently plowed or disked or if they show no sign of having been disturbed in recent decades, they are referred to as "natural areas" in this document.

This section describes the terrestrial habitat, land uses, and aquatic resources, including man-made and manipulated aquatic resources, sensitive aquatic resources, and special areas and conservation lands in the study area or in close proximity to the study area. The terrestrial habitats and land uses are based on the California Wildlife Habitat Relationships System (CDFG 2008; Mayer and Laudenslayer 1988) and conditions observed in the field assessments. Aquatic resources are as described in the *Fresno to Bakersfield Section: Revised Draft EIR / Supplemental Draft EIS* (FRA and Authority 2012a).

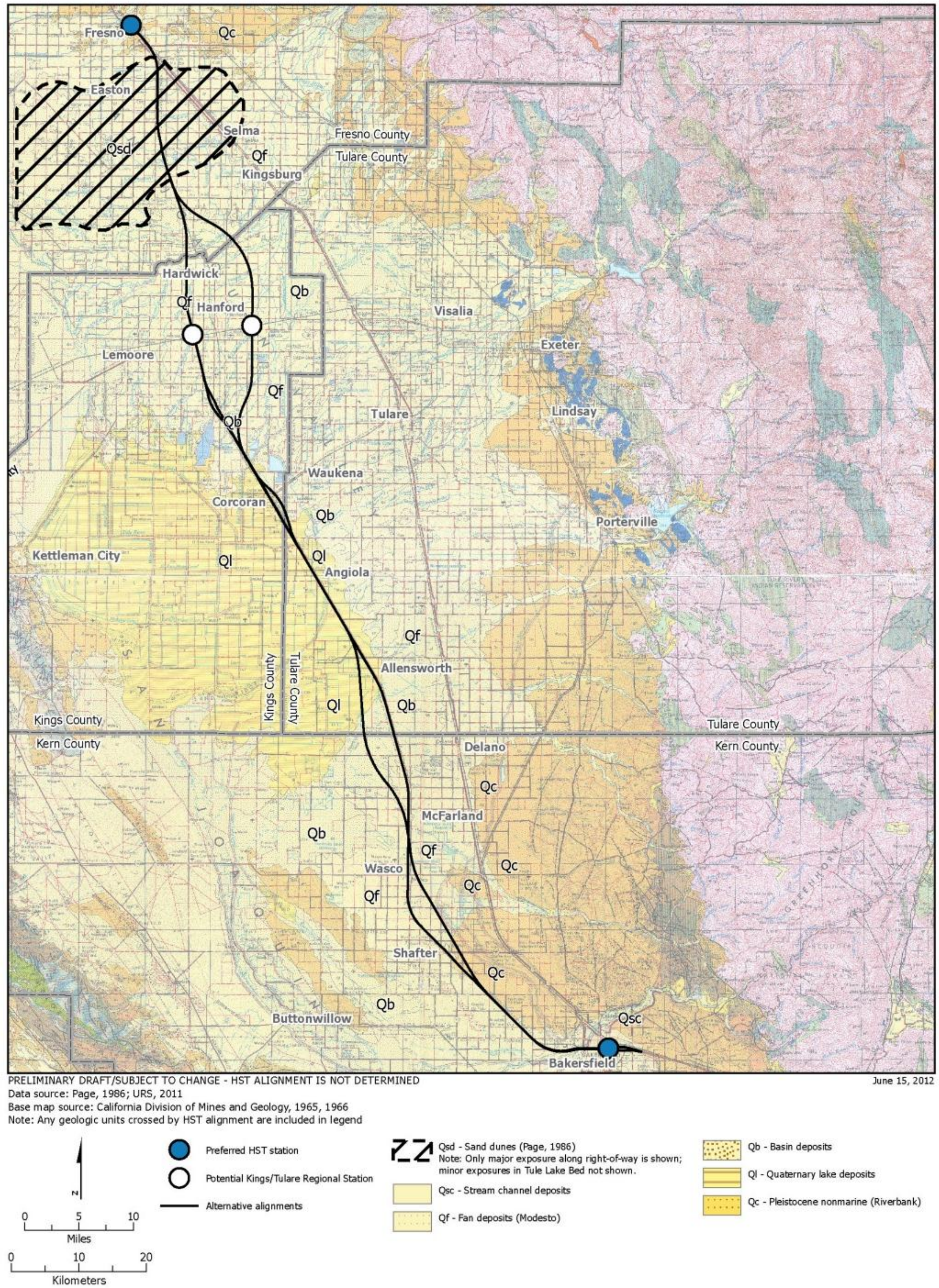


Figure 4-5
Physiographic characteristics

4.2.1 Terrestrial Habitats and Land Uses

The categories of terrestrial plant communities and land cover types that occur in the study area are summarized below. The plant communities and land cover types identified in the study area include agricultural lands, developed areas, semi-natural areas, and natural areas (Figure 4-6). Habitat conditions in the study area are discussed in detail in *Fresno to Bakersfield Section: Biological Resources and Wetlands Technical Report* (Authority and FRA 2012b).

The following descriptions of plant communities and land cover types are based on *A Guide to the Wildlife Habitats of California* (Mayer and Laudenslayer 1988) and the California Wildlife Habitat Relationships System (CDFG 2008).

4.2.1.1 Agricultural Lands

Eight types of agricultural land are found in the study area: cropland, dryland grain crops, irrigated grain crops, irrigated hayfield, irrigated row and field crops, deciduous orchard, evergreen orchard, and vineyard. These land uses, along with urban land uses, characterize the overwhelming majority of land in the study area. Agricultural lands may provide marginal habitat for seasonal forage and refugia for a limited number of common species and special-status species. Ruderal plant species, which are defined as species that grow where the natural vegetation has been removed or significantly degraded by past or current human activity, are found in these agricultural land types, especially where these types are bordered by roads, canals, ditches, or other highly disturbed features. Vegetation in these areas is highly variable but often includes a mix of non-native annual grasses such as ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus madritensis* ssp. *rubens*), wild oats (*Avena* spp.), Italian ryegrass (*Lolium multiflorum*), and smooth barley (*Hordeum murinum*) and weedy forbs such as bur clover (*Medicago polymorpha*), redstem filaree (*Erodium cicutarium*), yellow star thistle (*Centaurea solstitialis*), Russian thistle (*Salsola tragus*), tumbleweed, (*Amaranthus albus*), Johnson grass (*Sorghum jalapense*), and silver-leaf horsenettle (*Solanum elaeagnifolium*).

Some agricultural species have become naturalized outside the areas where they are planted. These include black mustard (*Brassica nigra*), rape mustard (*Brassica rapa*), Johnson grass (*Sorghum jalapense*), cultivated timothy (*Phleum pretense*), common barley (*Hordeum vulgare*), common wheat (*Triticum aestivum*), and peach (*Prunus persica*). Native species that also occur in ruderal areas in agricultural lands often consist of saltgrass (*Distichlis spicata*), fiddleneck (*Amsinckia menziesii* var. *intermedia*), Canada horseweed (*Conyza canadensis*), annual sunflower (*Helianthus annuus*), alkali mallow (*Malva leprosa*), and tarplants (*Hemizonia* spp.). Field and row crops such as alfalfa provide foraging habitat for raptors, particularly Swainson's hawks (*Buteo swainsoni*). Fallow fields and inactive farmland may provide nesting habitat for several wildlife species, including northern harrier (*Circus cyaneus*) and western burrowing owl (*Athene cunicularia*). These and other agricultural lands may provide foraging or dispersal habitat for loggerhead shrike (*Lanius ludovicianus*), white-tailed kite (*Elanus leucurus*), and American badger (*Taxidea taxus*).

4.2.1.2 Developed Areas

Developed areas are characterized by various types of cover, including barren and urban (e.g., commercial/industrial, and transportation corridors. These areas generally include landscaped areas, yards, and various outbuildings and provide low-quality resources for wildlife. However, certain species, such as the American peregrine falcon (*Falco peregrinus anatum*) and western mastiff bat (*Eumops perotis californicus*) have adapted to developed areas and may use these areas for nesting or roosting habitat.

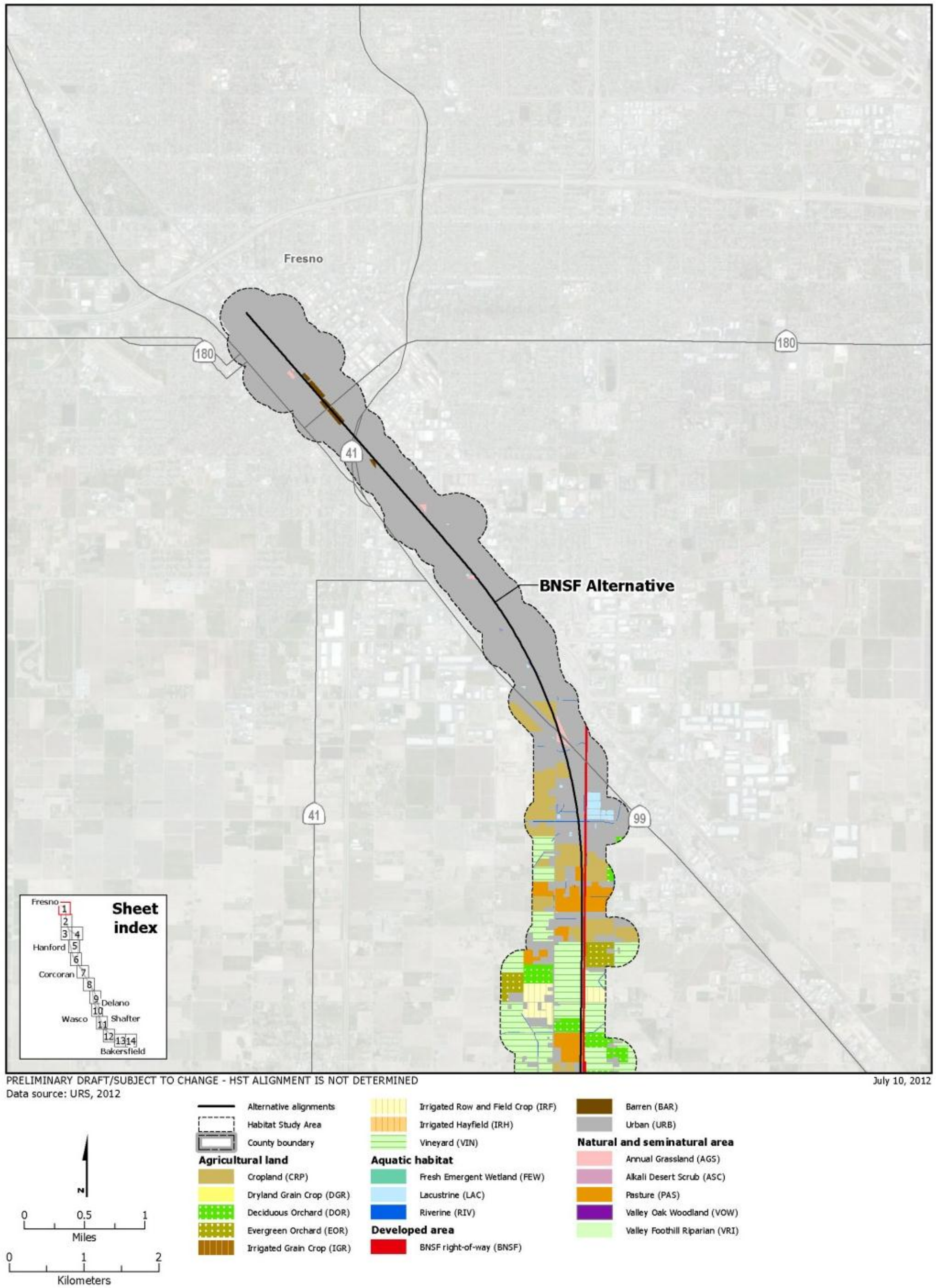


Figure 4-6
Wildlife habitat types (14 Sheets)

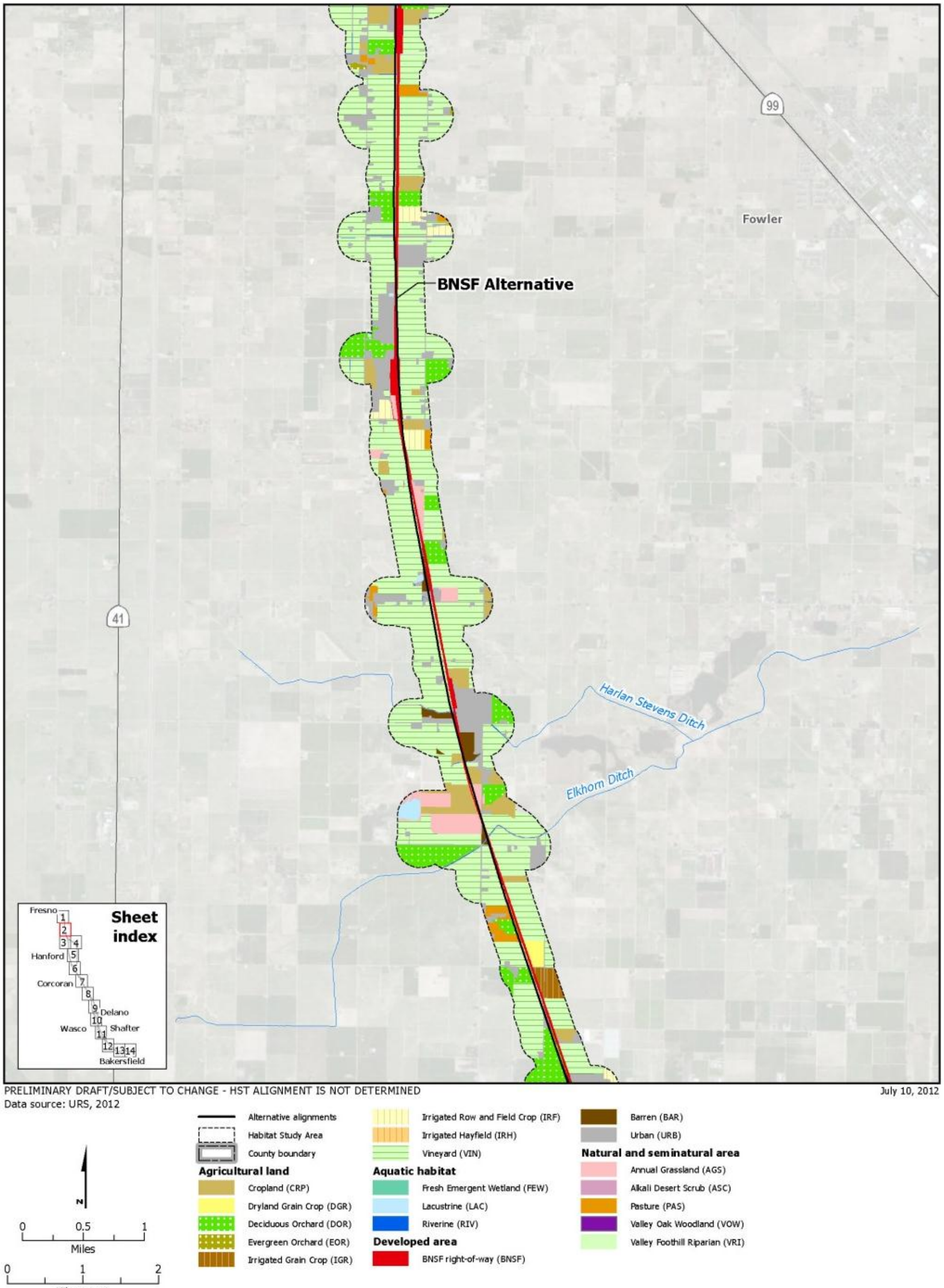
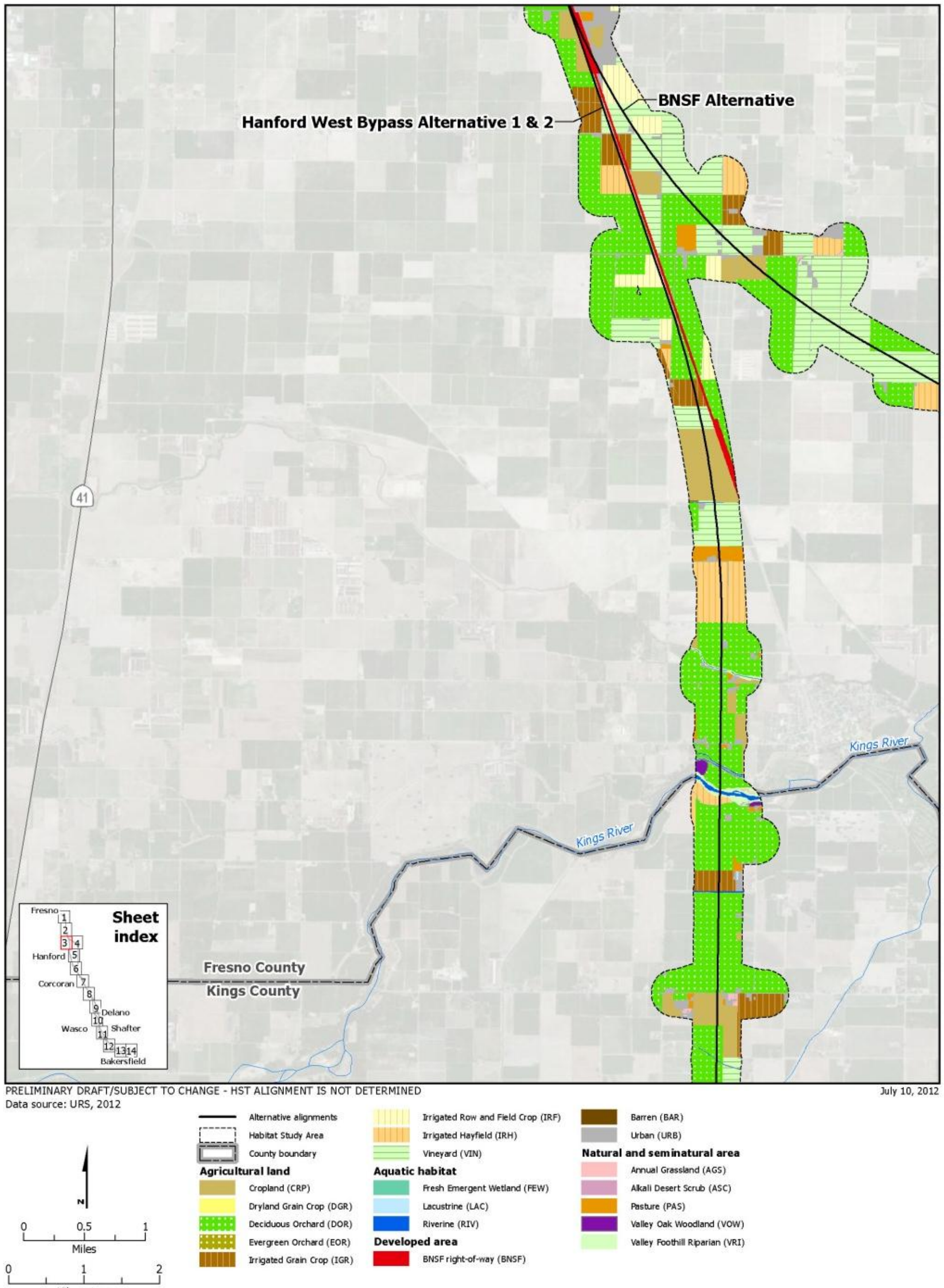


Figure 4-6
Wildlife habitat types (Sheet 2)



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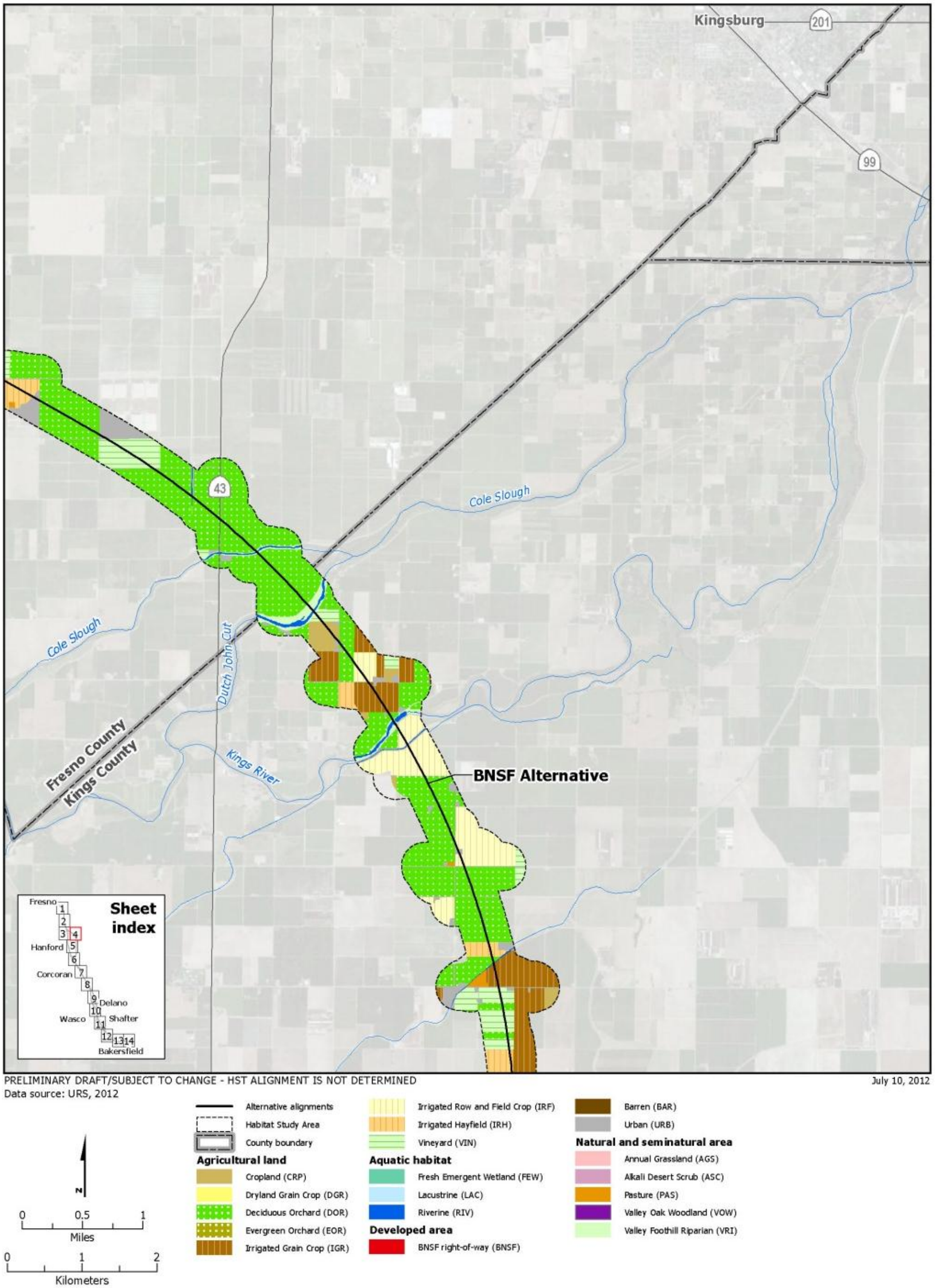
Wildlife habitat types (Sheet 3)



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Wildlife habitat types (Sheet 4)

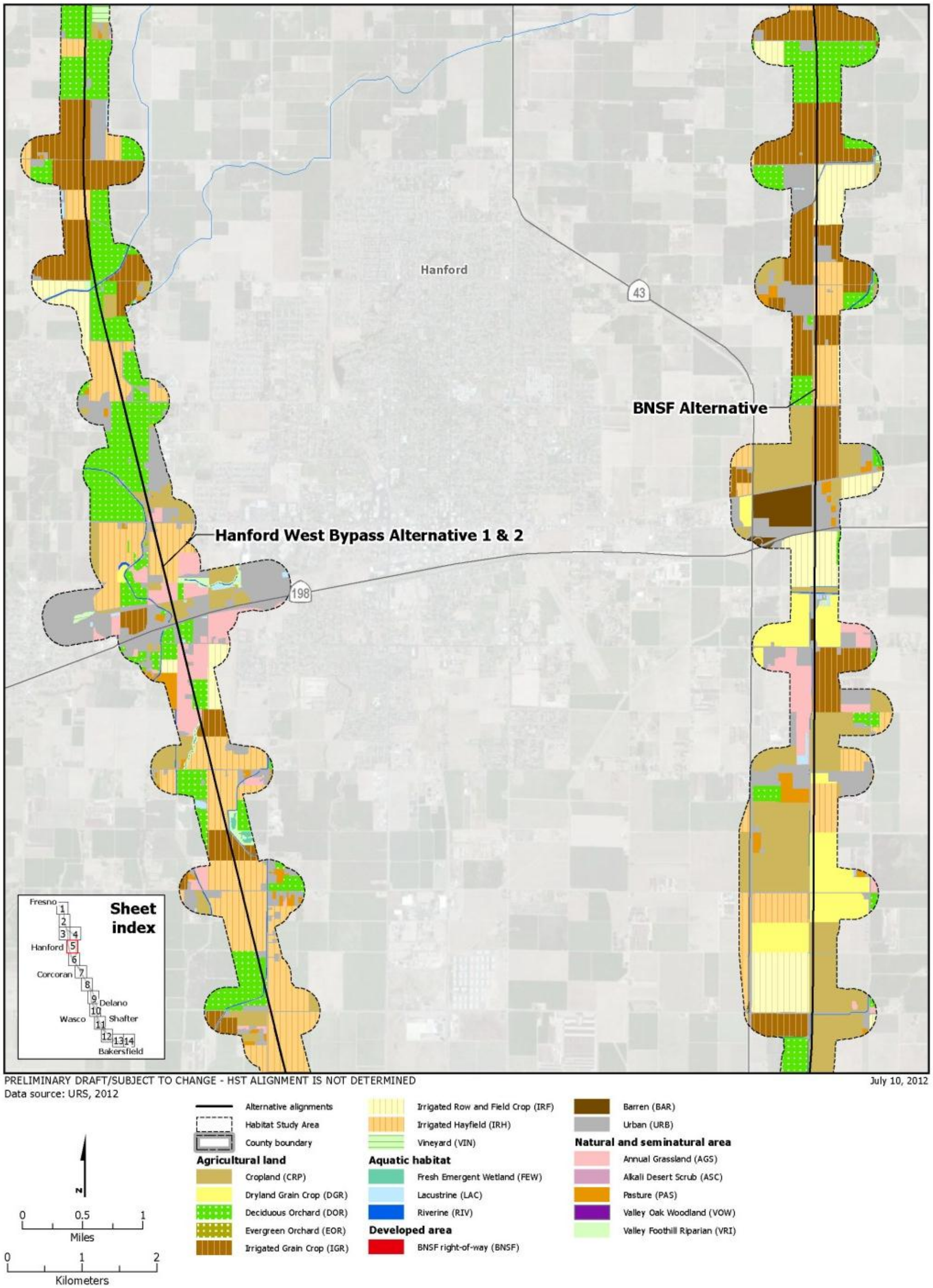

Figure 4-6
Wildlife habitat types (Sheet 5)

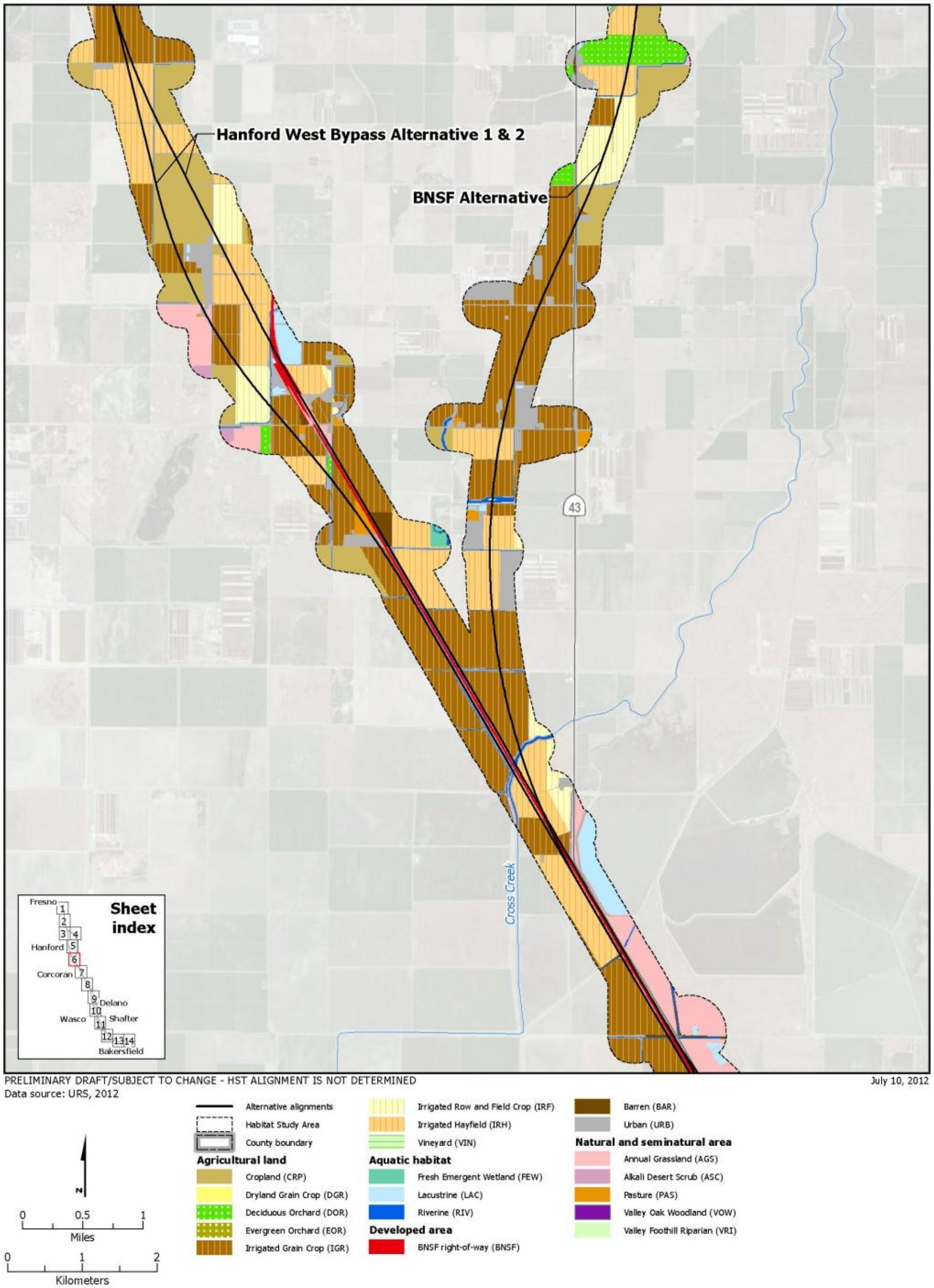

Figure 4-6
Wildlife habitat types (Sheet 6)

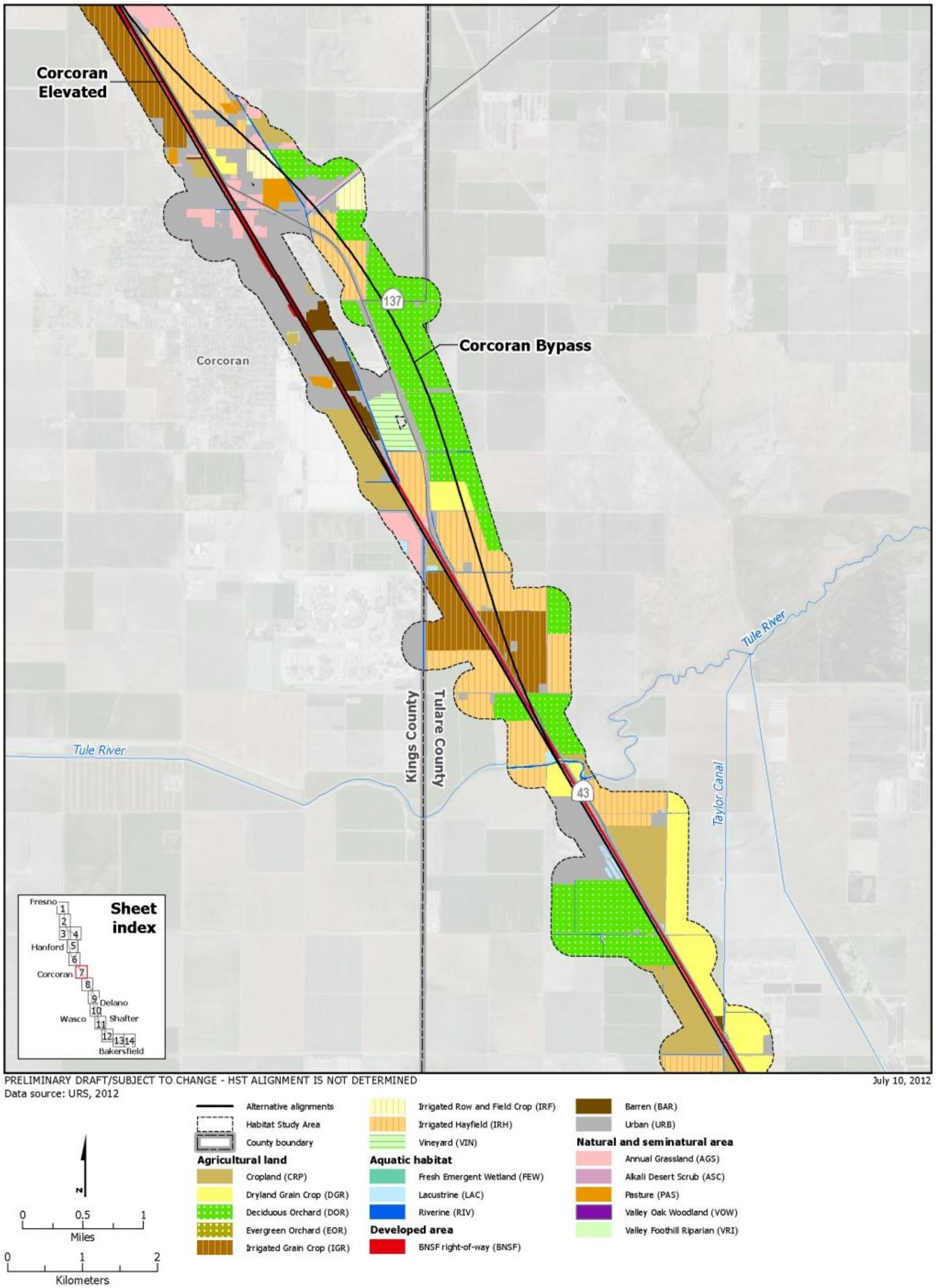

Figure 4-6
Wildlife habitat types (Sheet 7)

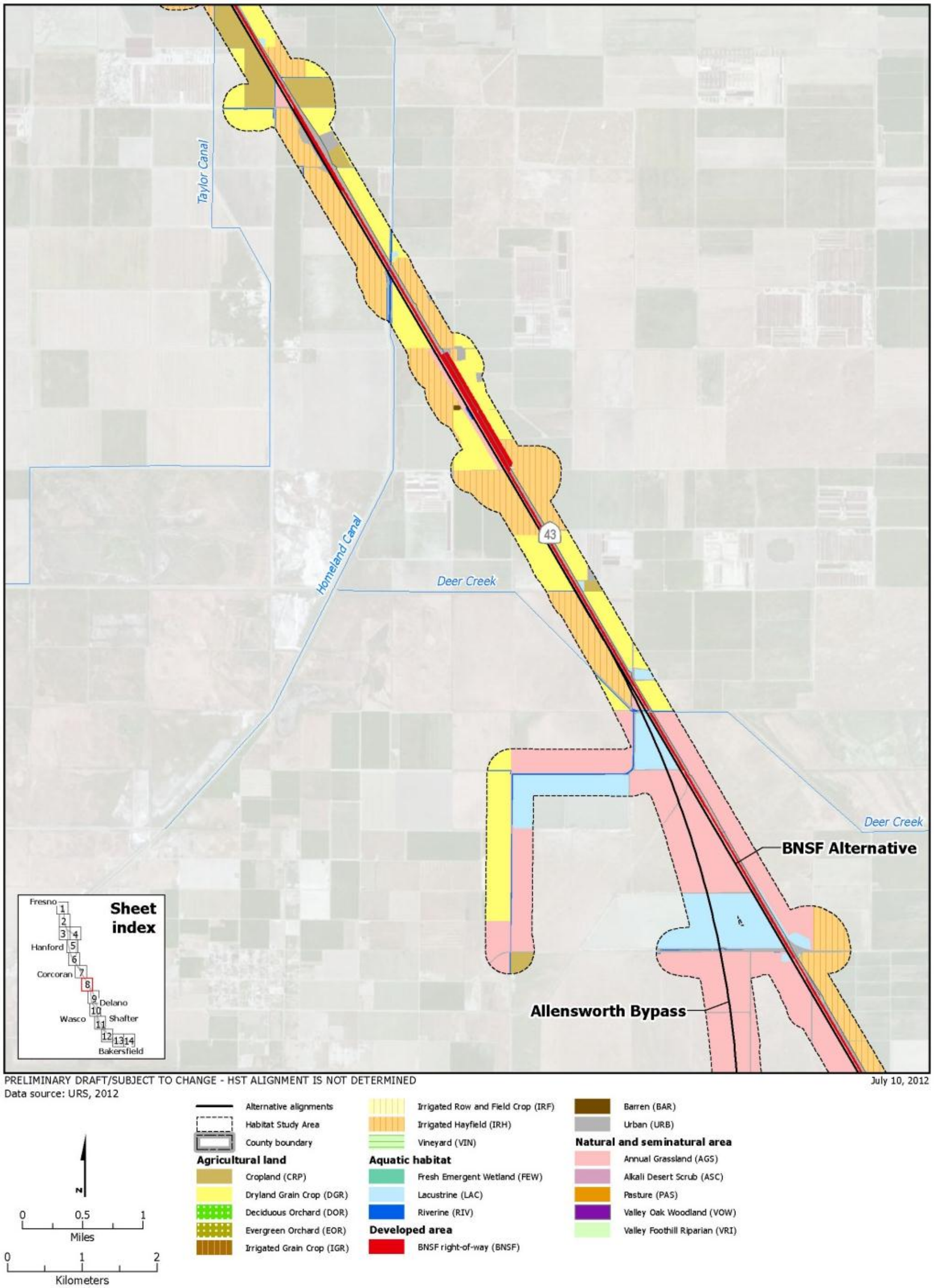

Figure 4-6
Wildlife habitat types (Sheet 8)

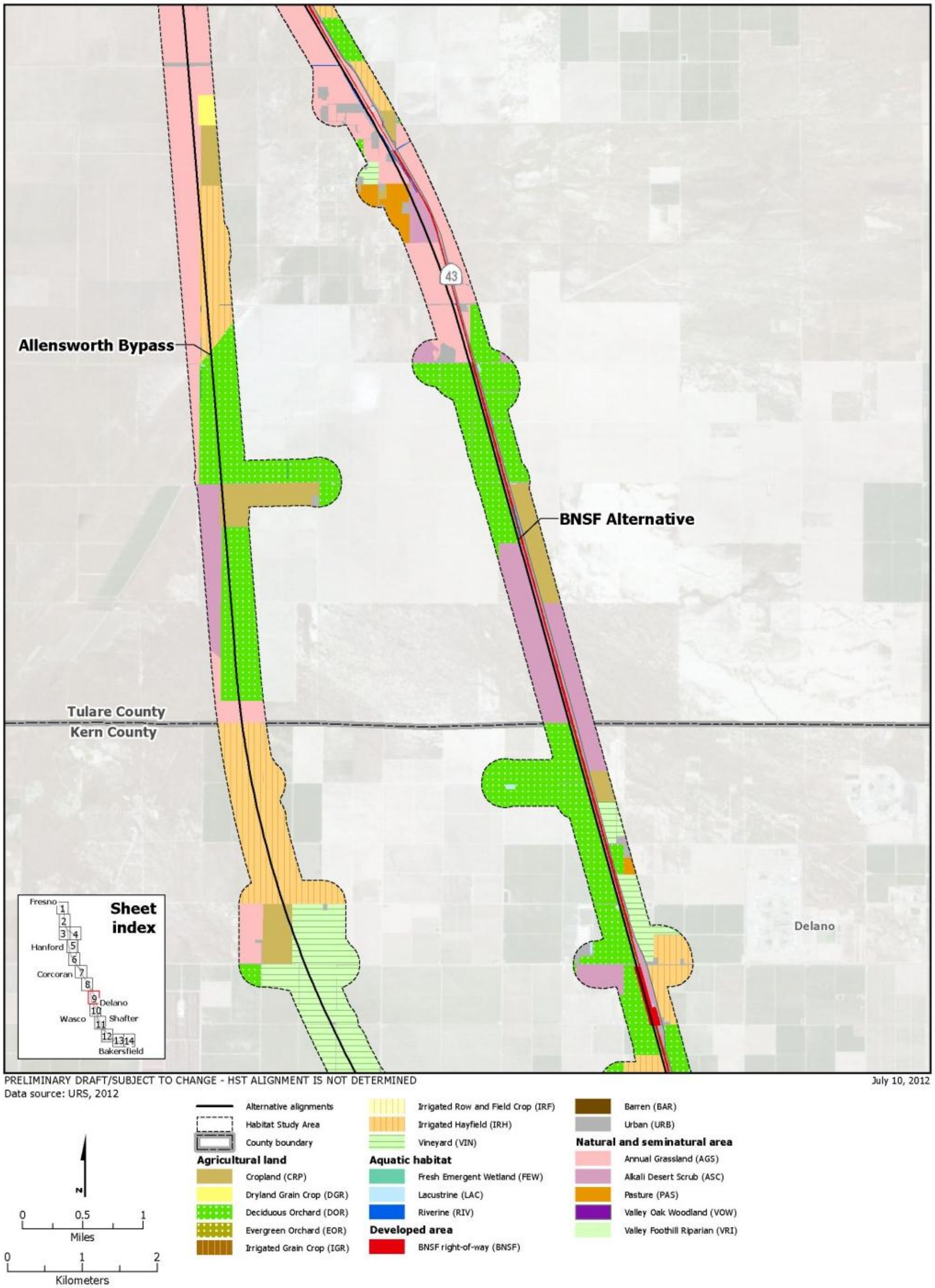

Figure 4-6
Wildlife habitat types (Sheet 9)

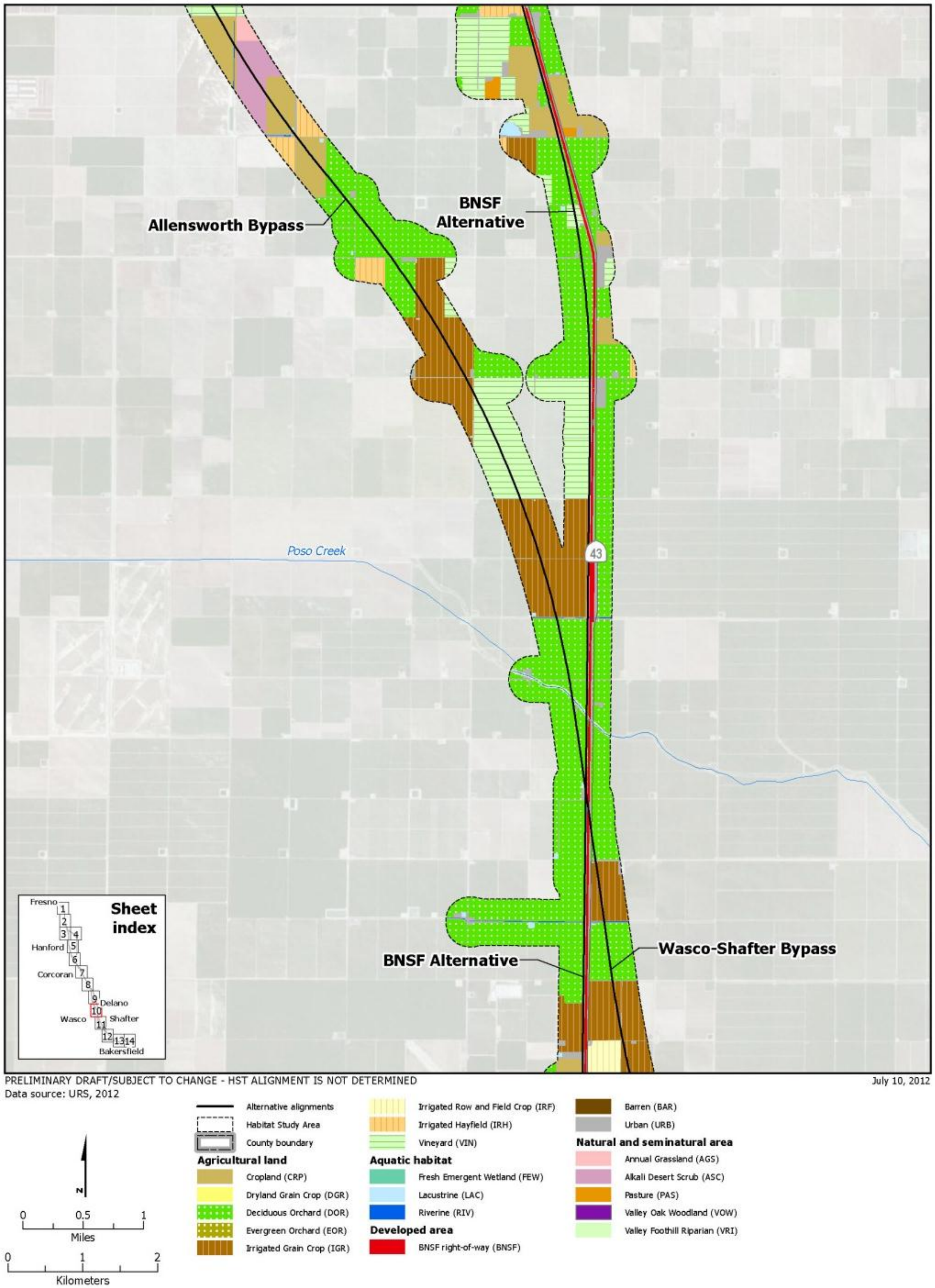

Figure 4-6
Wildlife habitat types (Sheet 10)

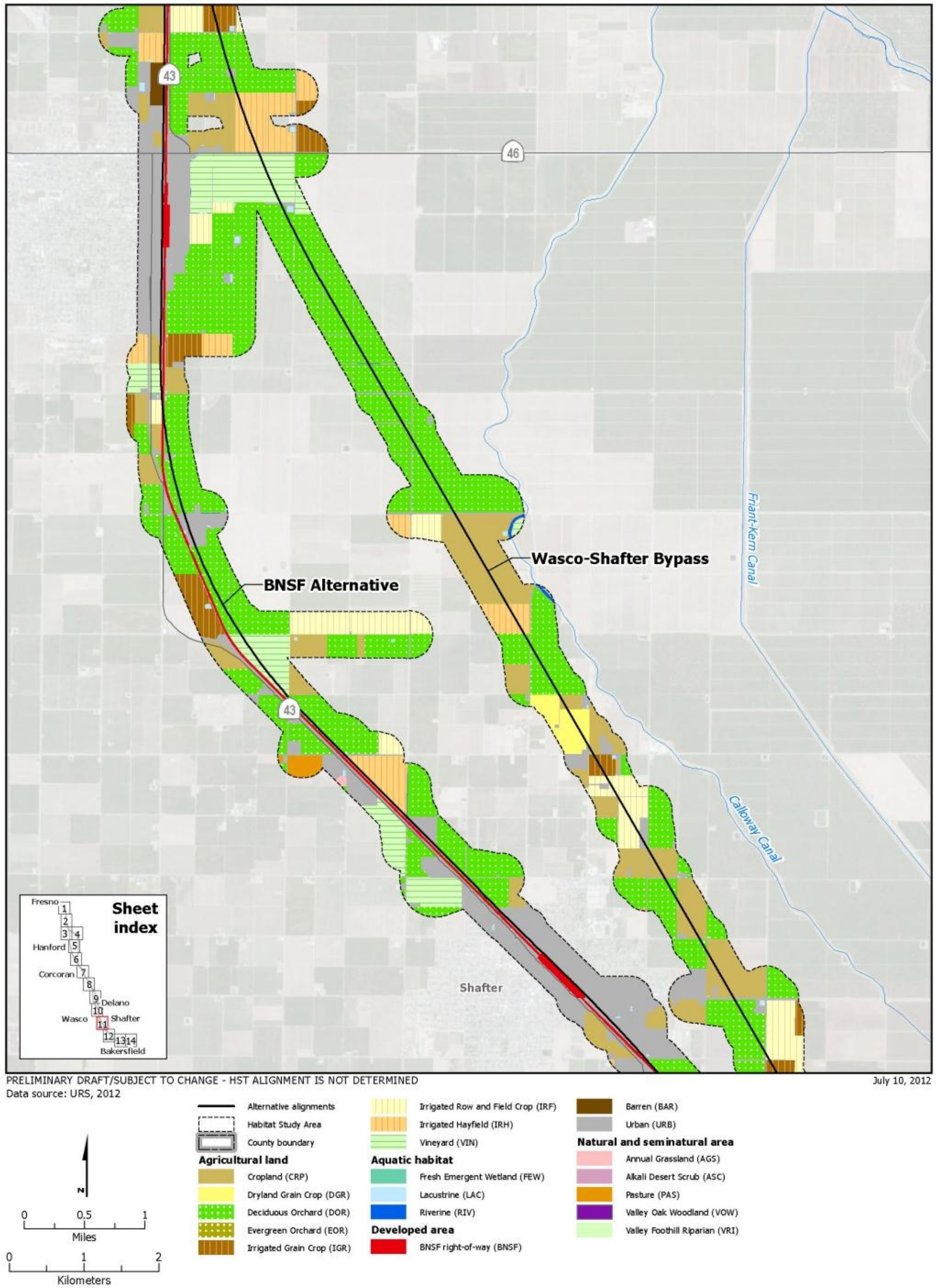

Figure 4-6
Wildlife habitat types (Sheet 11)

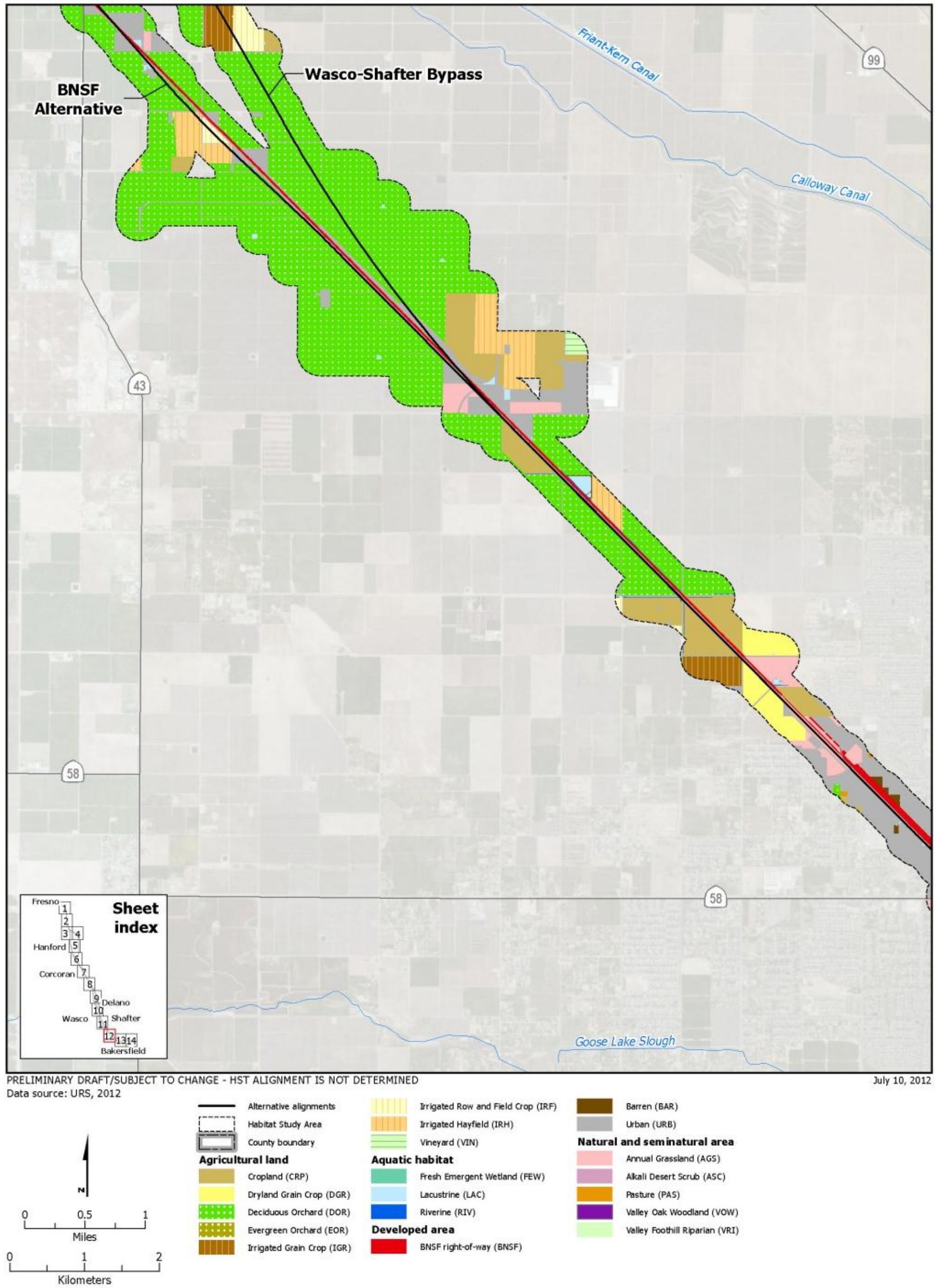

Figure 4-6
Wildlife habitat types (Sheet 12)

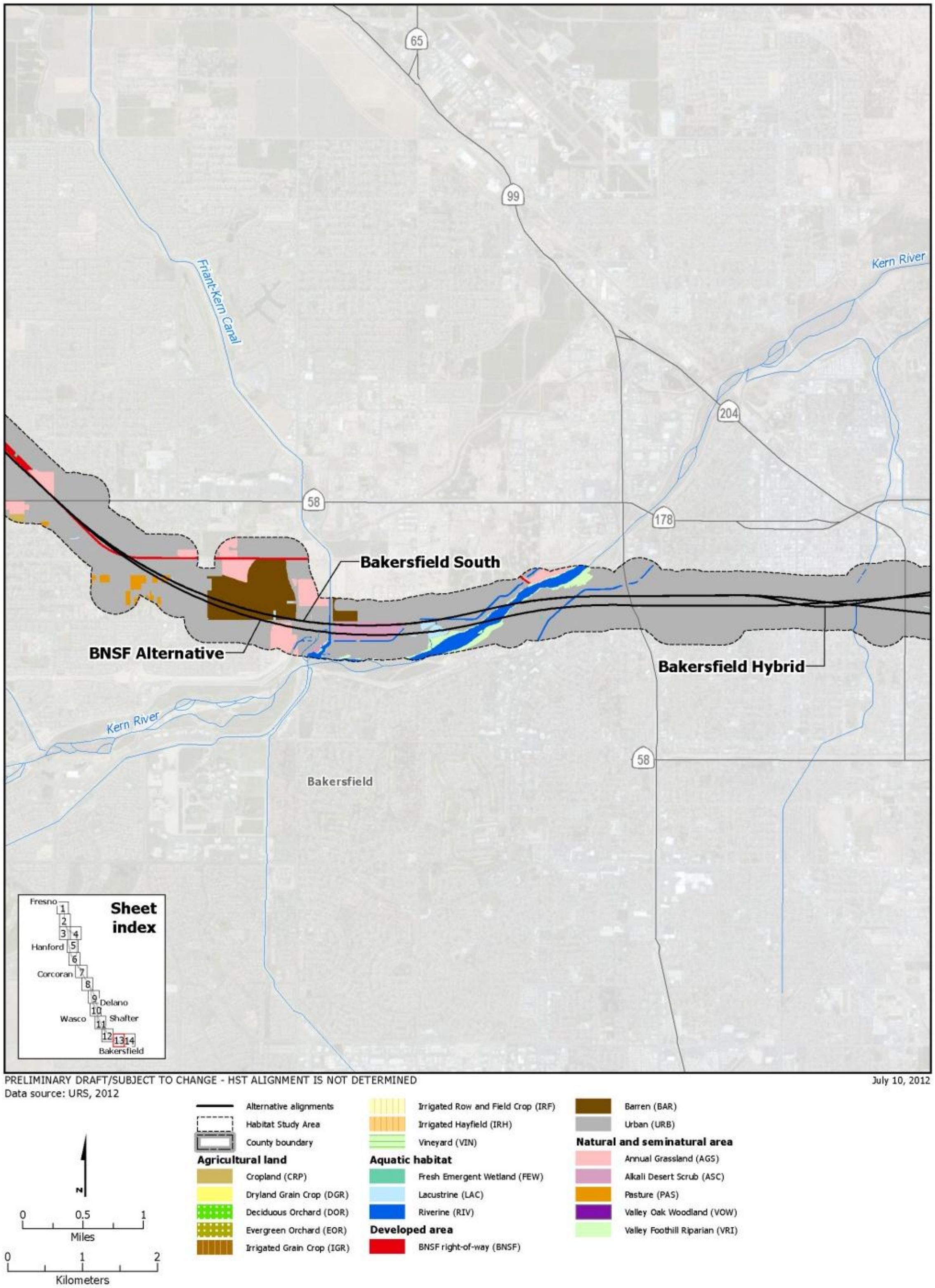

Figure 4-6
Wildlife habitat types (Sheet 13)

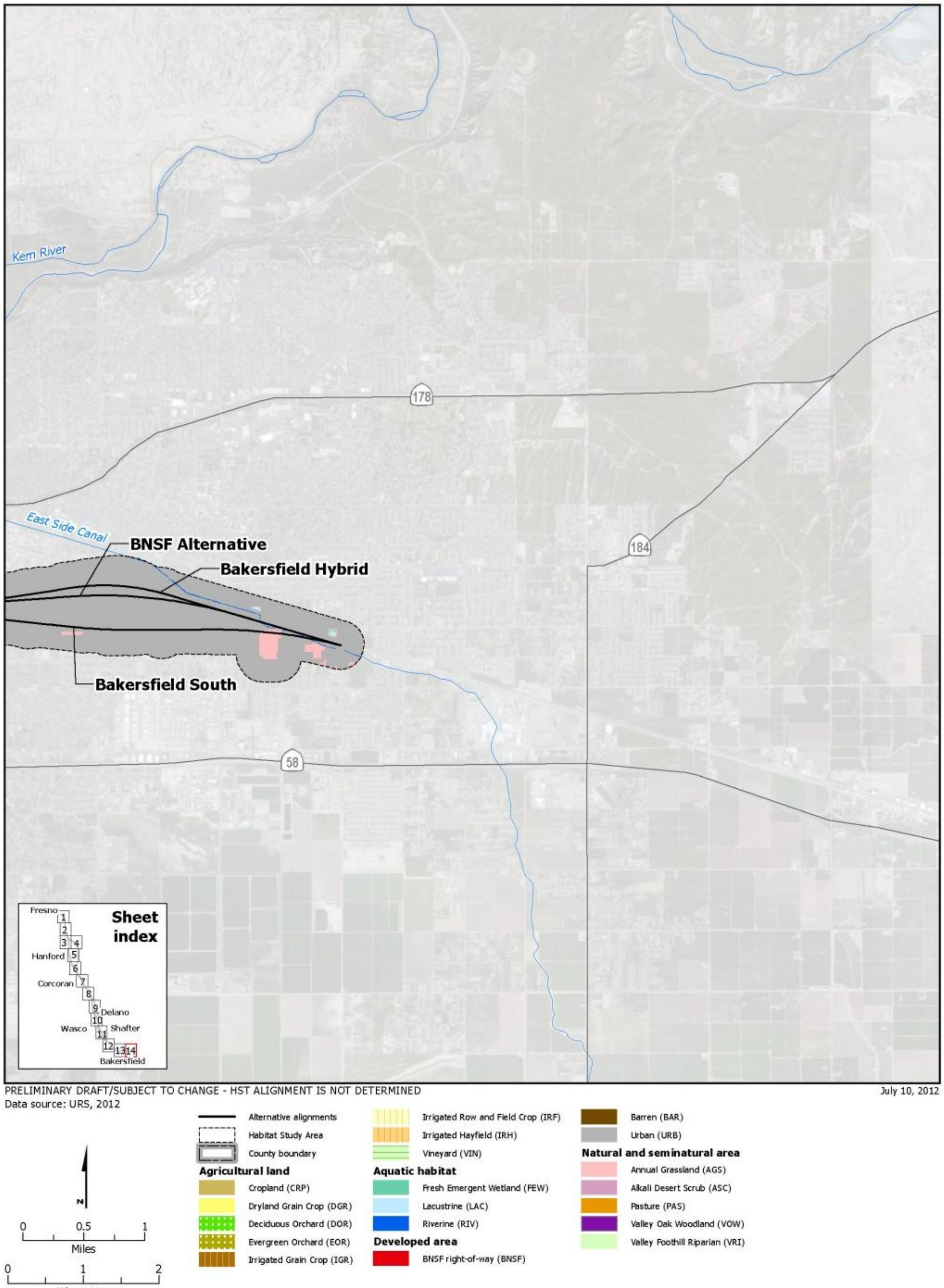

Figure 4-6
Wildlife habitat types (Sheet 14)

Ruderal and ornamental plant species, which are generally composed of non-native species, are dominant in all developed areas, particularly where land use was in transition and bare ground had recently been revealed, such as by roadsides, in median strips, and in vacant lots. Vegetation in these areas is highly variable, but generally includes non-native grass species, including ripgut bromes, wild oats, Italian ryegrass, and smooth barley, and weedy forbs, including bur clover, redstem filaree, yellow star thistle, Italian thistle (*Carduus pycnocephalus*), black mustard, rape mustard, white goosefoot (*Chenopodium album*), stinking goosefoot (*Chenopodium vulvaria*), and silver-leaf horsenettle. Escaped ornamentals in these areas often include oleander (*Nerium oleander*), elms (*Ulmus* spp.), bachelor's buttons (*Centaurea cyanea*), spotted knapweed (*Centaurea maculosa*), butterfly bush (*Buddleja davidii*), Athel tree (*Tamarix aphylla*), tree tobacco (*Nicotiana glauca*), and Himalayan blackberry (*Rubus armeniacus*).

Barren

Barren areas are defined by the permanent absence of vegetation. Areas mapped as barren during the field survey include areas of bare earth resulting from industrial activities such as gravel extraction. Barren habitats support few native wildlife or plant species, though rock dove (*Columba livia*), Brewer's blackbird (*Euphagus cyanocephalus*), killdeer (*Charadrius vociferus*), and western fence lizard (*Sceloporus occidentalis*) were observed in barren areas during the field surveys.

Urban

Urban areas include municipalities; industrial, residential, and agricultural structures (e.g., feedlots, poultry farms); and adjacent dedicated areas, such as yards, roads and road shoulders, highways, parking lots, and stockpiles. Both adaptive native species and non-native wildlife species occur in urban centers of the study area. Within urban areas, mapped wetland features such as ditches and seasonal wetlands are present. In Bakersfield, special-status species like the San Joaquin kit fox (*Vulpes macrotis mutica*) have also become acclimated to developed urban areas (CDFG 2012).

BNSF Urban

The BNSF Railway right-of-way travels the length of the Central Valley in a north-south direction, extending south from Fresno through Hanford and paralleling SR 43 from north of Corcoran to the town of Greenacres, just west of Bakersfield. In general, the BNSF Railway right-of-way is 50 feet wide and the rail tracks are set on an embankment that is a minimum of 5 feet above the surrounding grade. The embankment is constructed of compacted soil and imported gravel fills. Numerous culverts bisect the base of the berms for drainage purposes. Crossings of larger drainages exist as freestanding bridges. Most road crossings of the BNSF Railway right-of-way consist of at-grade crossings that allow vehicles to drive over the berms and tracks.

For the purposes of this analysis, all developed lands (e.g., crop, urban) in the BNSF Railway right-of-way were mapped under the BNSF urban classification. All areas of developed habitats (e.g., urban) in the right-of-way are controlled by the BNSF Railway, which retains the right to modify land use (e.g., remove orchard trees or structures). All riverine, canal, and natural upland habitats (i.e., annual grassland, alkali desert scrub, and valley foothill riparian) in the BNSF Railway right-of-way were mapped as such, not as BNSF Railway right-of-way.

At any given point along the BNSF Railway right-of-way, wildlife use is largely determined by adjacent habitats. However, in areas dominated by frequent soil disturbance, especially cropland habitats, the railroad berms may provide habitat for burrowing animals. The BNSF Railway right-of-way contains mapped wetland features such as seasonal wetlands and vernal pools.

4.2.1.3 Semi-Natural Areas

The term *semi-natural* is used to distinguish the land uses described in the previous sections from plant communities where current human influences only moderately influence the plant composition and structure. Although the semi-natural plant communities have been altered to some extent by past and present human activities, the composition and structure of these communities are generally not actively managed or controlled.

Pasture

Pastures are actively grazed fields associated with private property. Generally, these areas contain a mix of annual grasses, such as bromes, barley, oats, and annual fescues, with other herbaceous species. Typically, these areas are actively grazed by cattle or horses but not irrigated. These areas provide some potential to support special-status wildlife species and limited potential to support special-status plant species because of the high level of disturbance.

4.2.1.4 Natural Areas

The term *natural* is used to distinguish the land uses and semi-natural plant communities from plant communities where current human influences do not significantly influence the plant composition and structure. These natural areas could potentially support the life history requirements of special-status species that may be present in the study area. Natural areas are largely fragmented in the study area and may have experienced some alteration by past human activities; these characteristics reduce the potential of these areas to support special-status species. However, the composition and structure of these communities are generally not actively managed or controlled. This subsection provides descriptions for these special natural areas.

Alkali Desert Scrub

Alkali desert scrub vegetation in the study area is dominated by shrublands with understory cover of herbs and forbs and by vernally inundated or saturated areas lacking a shrub layer (vernal pools). These latter areas are characterized by herbs and forbs interspersed with barren, vernally inundated, or saturated alkali patches. Primary plant species observed during the various surveys included spinescale saltbush (*Atriplex spinifera*), cattle saltbush (*Atriplex polycarpa*), iodine bush (*Allenrolfea occidentalis*), goldenbush (*Isocoma acradenia*), and bush seepweed (*Suaeda moquinii*).

Alkali desert scrub supports a wide variety of wildlife species, including special-status species such as the blunt-nosed leopard lizard (*Gambelia sila*), the San Joaquin kit fox, the Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), and coast horned lizards *(Phrynosoma blainvillii*). Many wildlife species found in this habitat type are burrowers or burrow-dependent species, such as the western burrowing owl, western spadefoot toad (*Spea hammondii*), American badger, foxes (*Vulpes* sp.), coyote (*Canis latrans*), California ground squirrel (*Spermophilus beecheyi*), and a variety of kangaroo rats (*Dipodomys* spp.) species.

In the study area, this habitat is concentrated in the vicinity of Allensworth in relatively undisturbed areas. This community is fragmented throughout the region by agricultural land uses, linear infrastructure, and urban areas. Many natural areas have been converted to intensive agriculture land uses over the past 10 years.

Annual Grassland

Annual grasslands in the study area are typically characterized by non-native annual grass species. Dominant non-native grass species include several species of bromes, fescue (*Festuca* spp. and *Vulpia* spp.), oats (*Avena* spp.), and barley (*Hordeum* spp.). Native species, including

goldfields and owl's clover (*Castilleja* spp.), may be present in annual grasslands, but typically in lower densities. Annual grasslands in the study area have typically experienced some level of past disturbance associated with various agriculture practices, row cropping, or grazing. Although these areas typically have a history of disturbance, they continue to provide suitable habitat for a number of special-status plant and wildlife species.

Valley Oak Woodland

Valley oak woodland in the study area is along the floodplain of the Kings River and associated sloughs and side channels in the area of the Hanford West Bypass alternatives. This habitat is characterized by well-spaced stands of mature valley oak (*Quercus lobata*) with little or no sub-canopy and a well-developed herbaceous layer. Dominant herbaceous species include brome, annual fescues (*Vulpia* spp.), oats (*Avena* spp.), and barleys. Other herbaceous plants, including soap root (*Chlorogalum pomeridianum*), filaree, miner's lettuce, prickly ox-tongue (*Picris echioides*), and spiny sow thistle (*Sonchus asper*), may be present. In the study area, valley oak woodland abruptly transitions to developed areas such as cropland or orchard.

Valley oak woodland provides food, cover, nesting sites, and dispersal habitat for a wide variety of special-status wildlife species, including Swainson's hawk.

Valley Foothill Riparian

Valley foothill riparian biological communities in the study area are along the riparian corridors and associated floodplains or terraces of the Kings River, Cross Creek, Tule River, Deer Creek, Poso Creek, and Kern River and along their associated sloughs and side channels. These areas are characterized by tall trees, including Fremont cottonwood (*Populus fremontii*), western sycamore (*Platanus racemosa*), and valley oak. Subcanopy trees include white alder (*Alnus rhombifolia*) and ash (*Fraxinus* sp.). Understory shrubs and herbaceous species typically include California blackberry *(Rubus ursinus)*, elderberry (*Sambucus* sp.), poison oak (*Toxicodendron diversilobum*), buttonbush (*Cephalanthus occidentalis*), willows (*Salix* spp.), rushes (*Juncus* spp.), mugwort (*Artemisia douglasiana*), poison hemlock (*Conium maculatum*), and stinging nettle (*Urtica dioica* ssp. *holosericea*). In the study area, an abrupt transition from valley foothill riparian vegetation to cropland or orchard results in narrow bands of riparian vegetation.

Valley foothill riparian habitat provides food, water, migration and dispersal corridors, and escape, nesting, and thermal cover for an abundance of wildlife. Riparian vegetation also supports physical and biological processes, including temperature regulation and valuable aquatic food web services (inputs for nutrient cycling and food availability). Protected insects like the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) are native to these habitats (Mayer and Laudenslayer 1988). Several sensitive natural communities overlap with this habitat type, including valley oak woodland, Fremont cottonwood forest, Goodding's willow thickets, and red willow thickets.

4.2.2 Aquatic and Riparian Resources

A number of jurisdictional waters were identified in the study area, including wetlands, other waters of the U.S., and riparian areas (Figure 4-7). Identified wetland features include seasonal wetlands, emergent wetlands, and vernal pools and swales. Other waters of the U.S. identified in the study area include canals/ditches, lacustrine, and seasonal riverine. Additionally, riparian areas, that are generally found in association with seasonal riverine features, were identified and are discussed with aquatic resources because of the important functions they provide that affect water quality, including groundwater recharge, surface water supply, nutrient cycling, water filtration, temperature control, maintenance of plant and animal communities, sediment transport and storage, stream channel dynamic equilibrium, and streambank stabilization.

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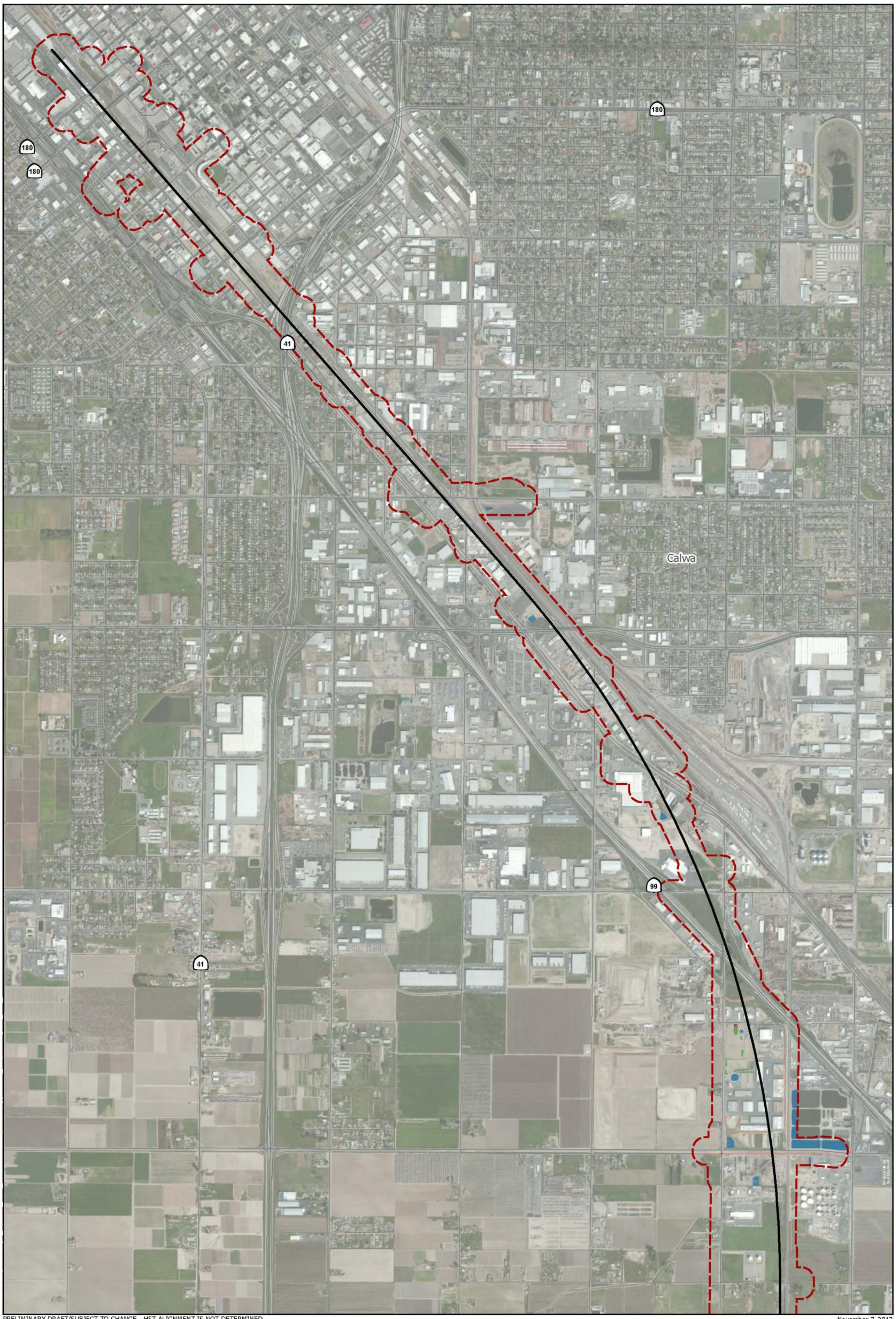

PRELIMINARY DRAFT/SUBJECT TO CHANGE - HST ALIGNMENT IS NOT DETERMINED
Source: URS, 2012

November 7, 2013

Other waters of the U.S.
- Canals/Ditches
- Culvert water
- Lacustrine
- Seasonal riverine

Riparian Areas (Not USACE Jurisdictional)*
- Riparian

Wetlands
- Seasonal wetland
- Vernal pool and swale

- Upland data point
- Wetland data point
- Alternative alignments
- Wetland study area

N

0 1,000 2,000
Feet

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Meters

Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 1 of 33)

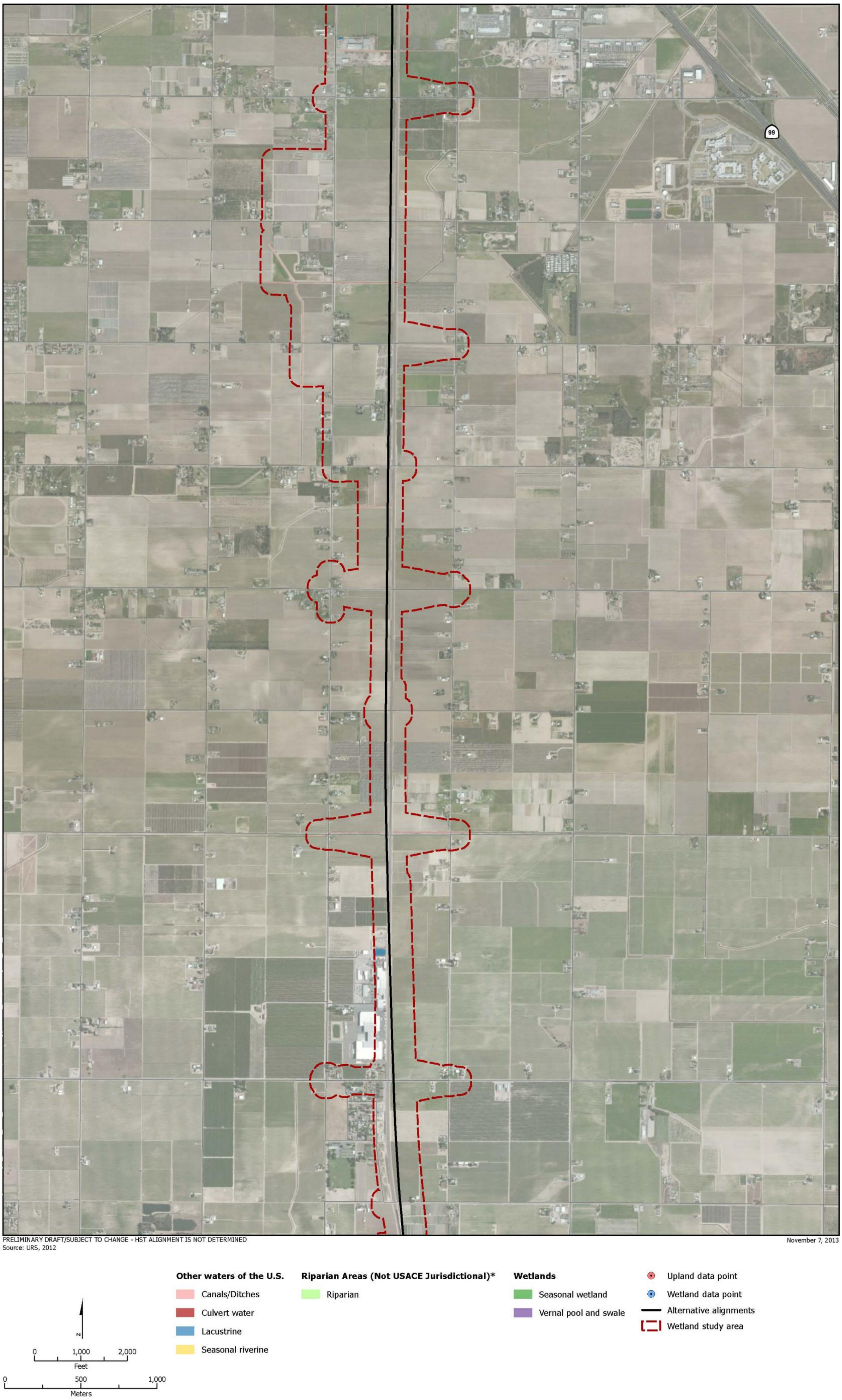


Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 2)

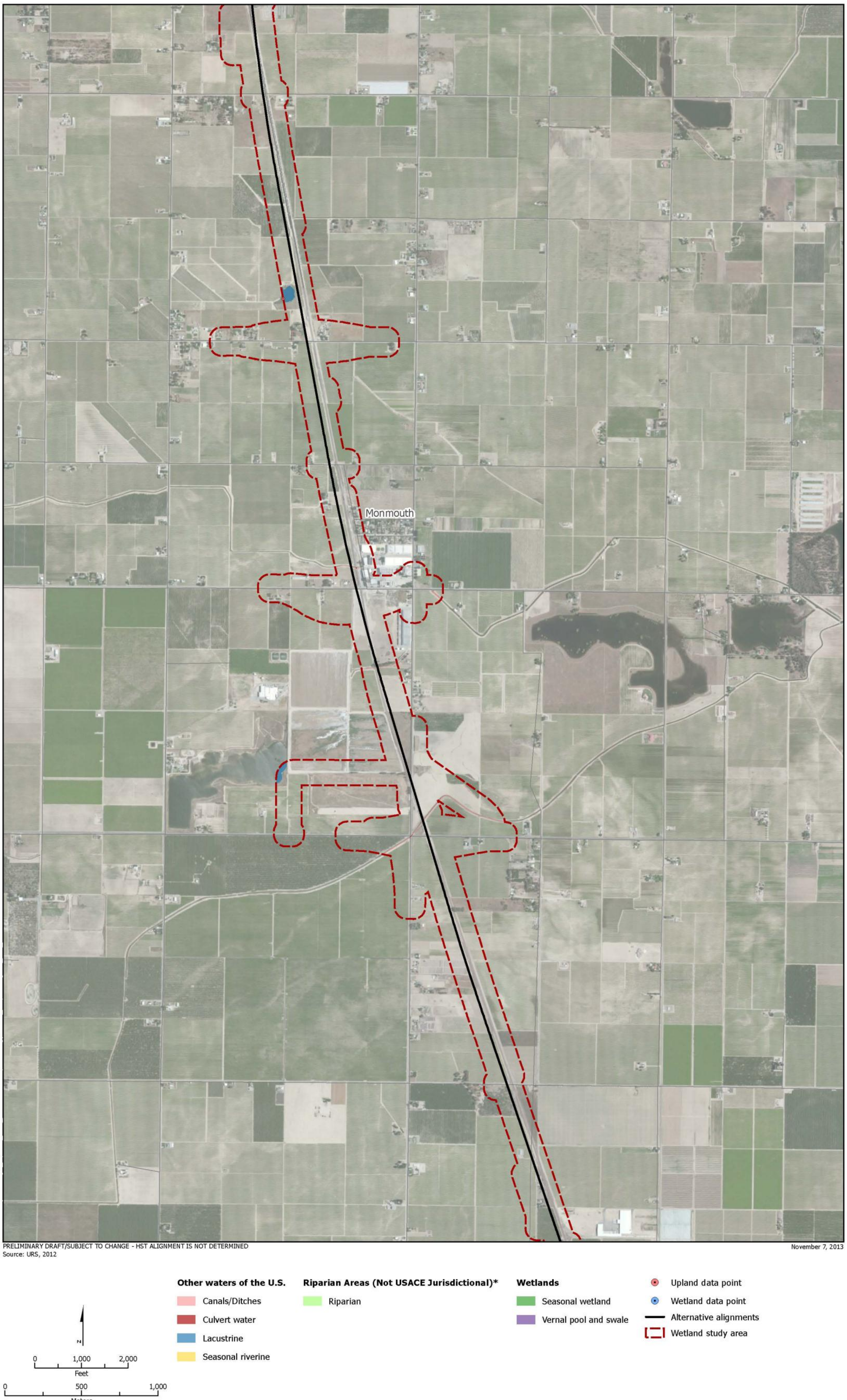


Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 3)

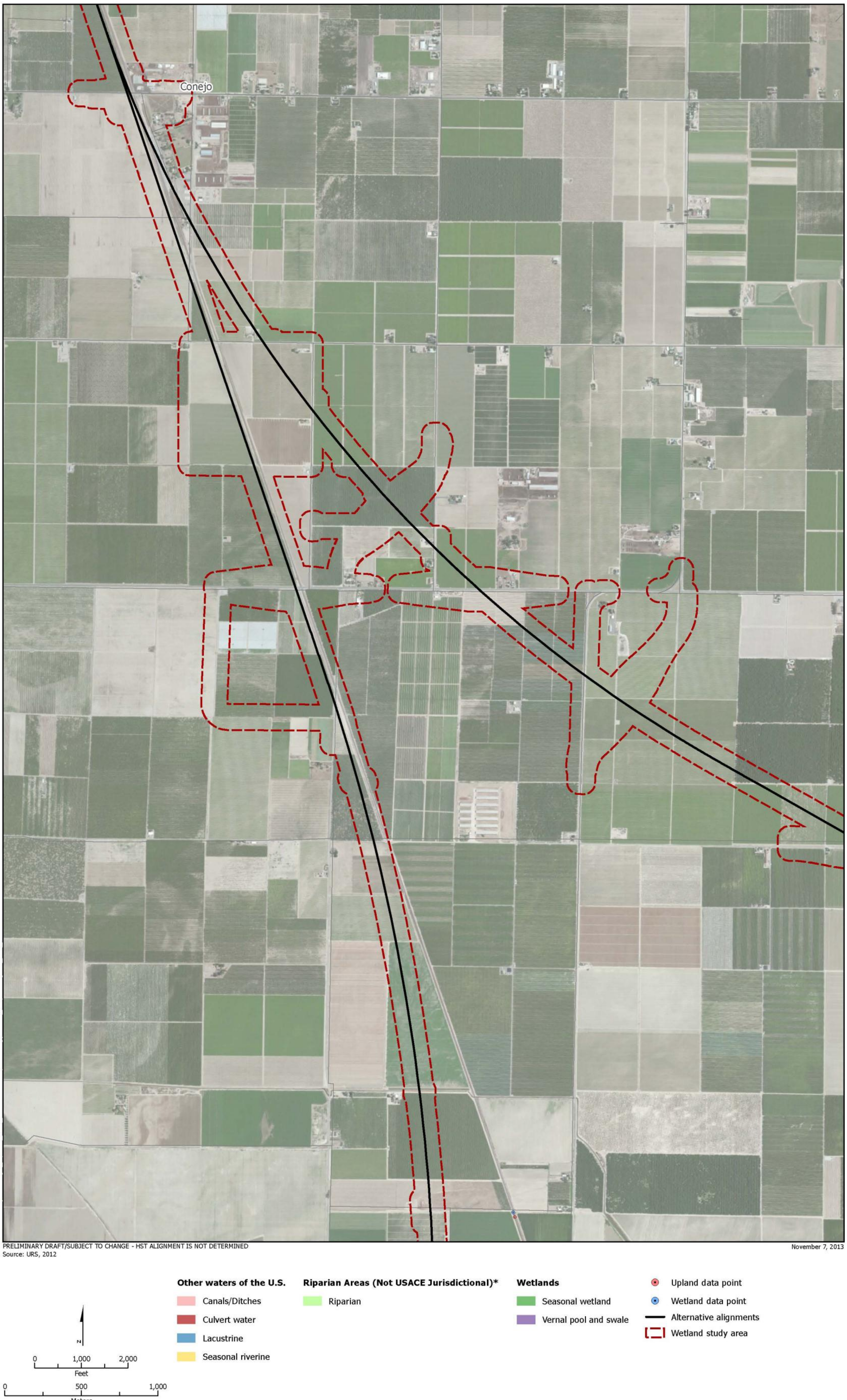
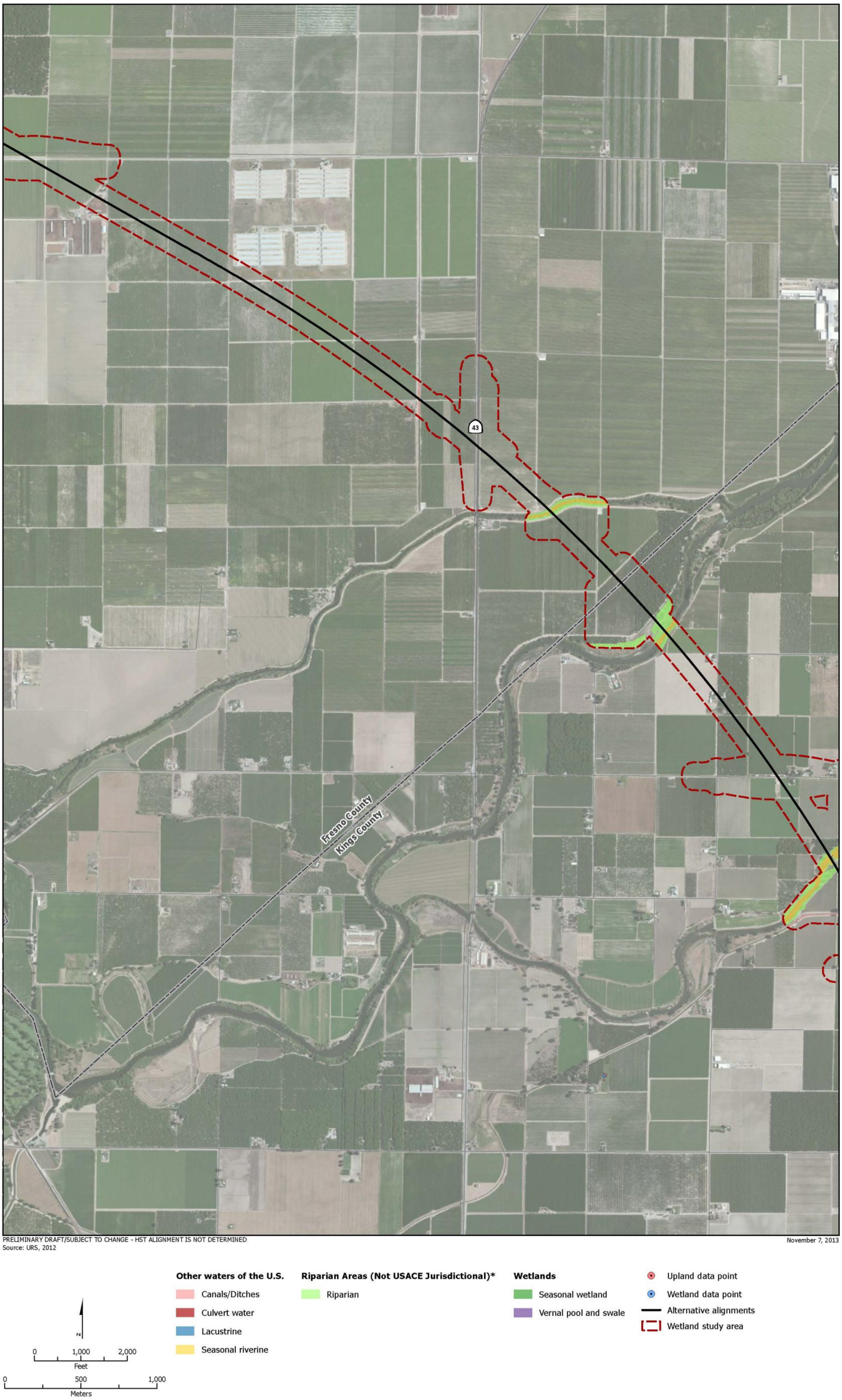


Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 4)



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Jurisdictional waters delineation and riparian areas (Sheet 5)

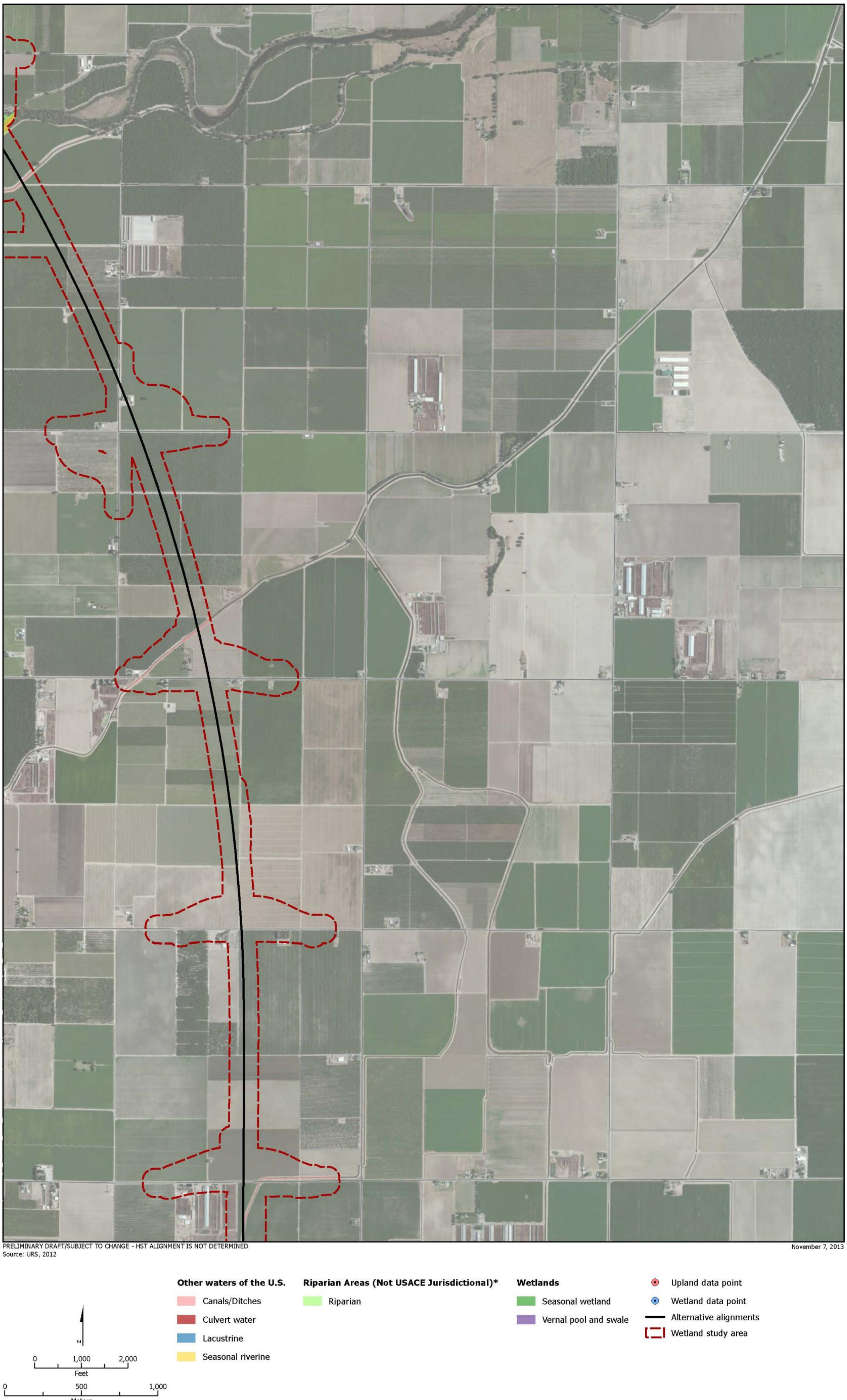


Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 6)

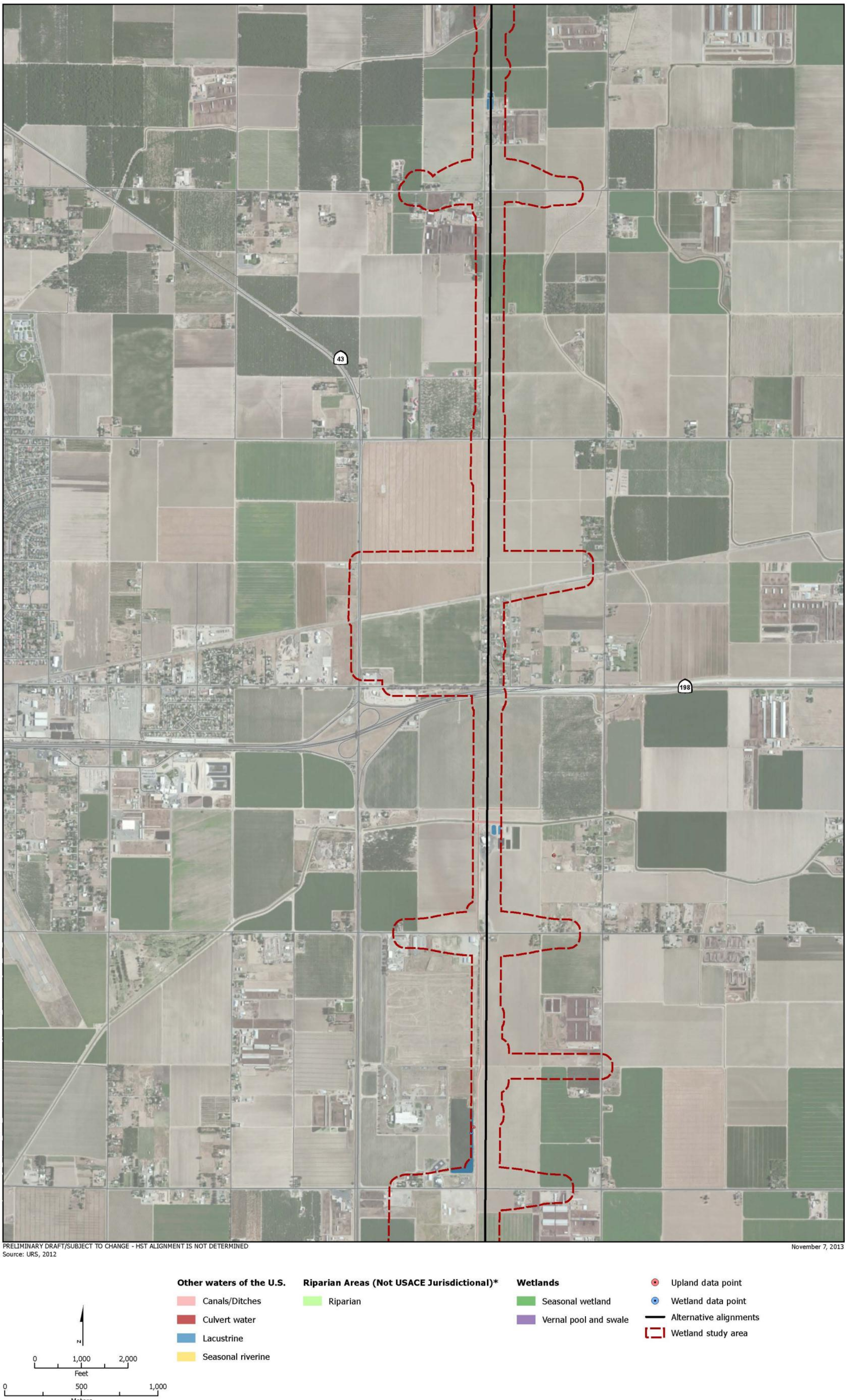


Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 7)

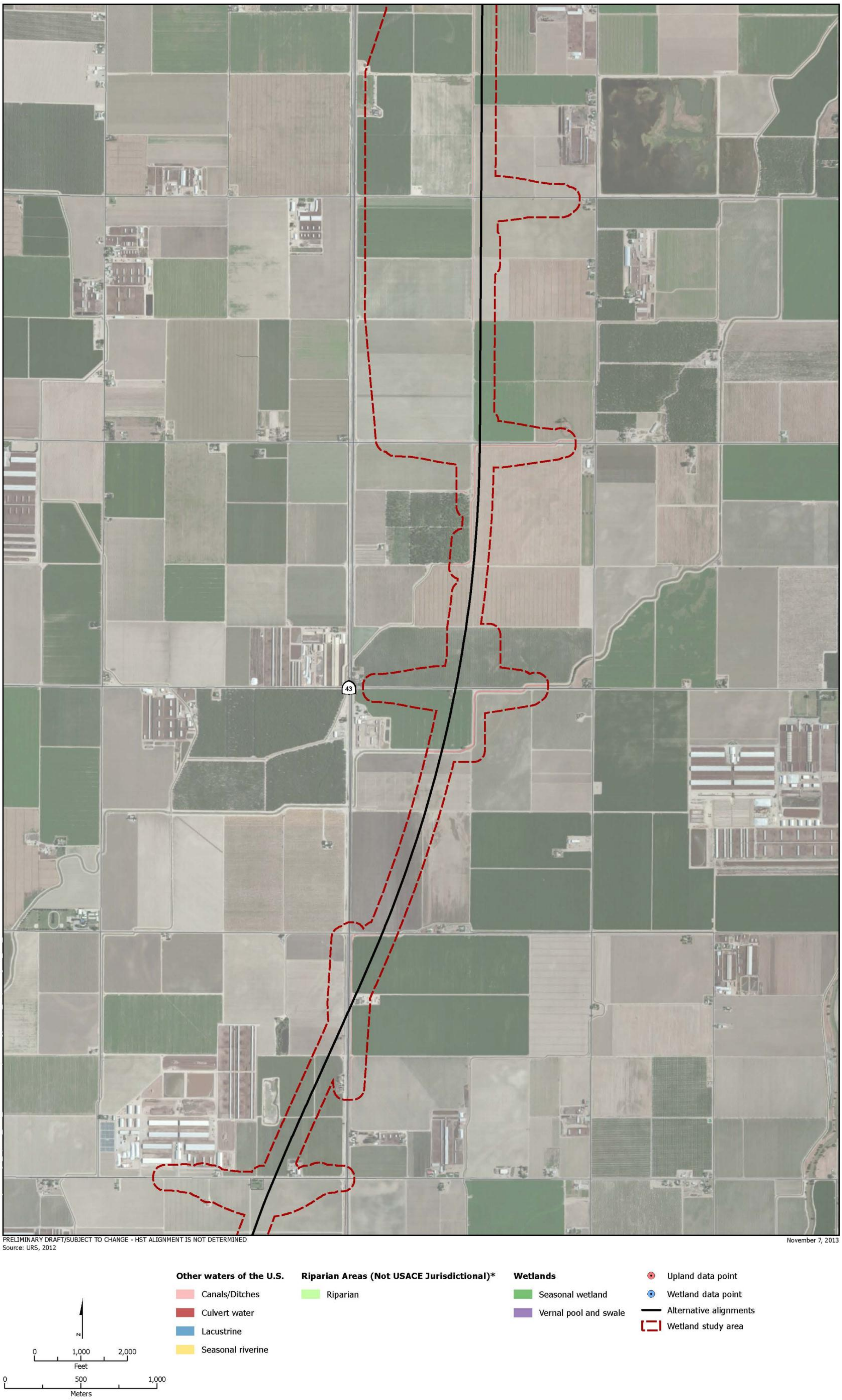


Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 8)

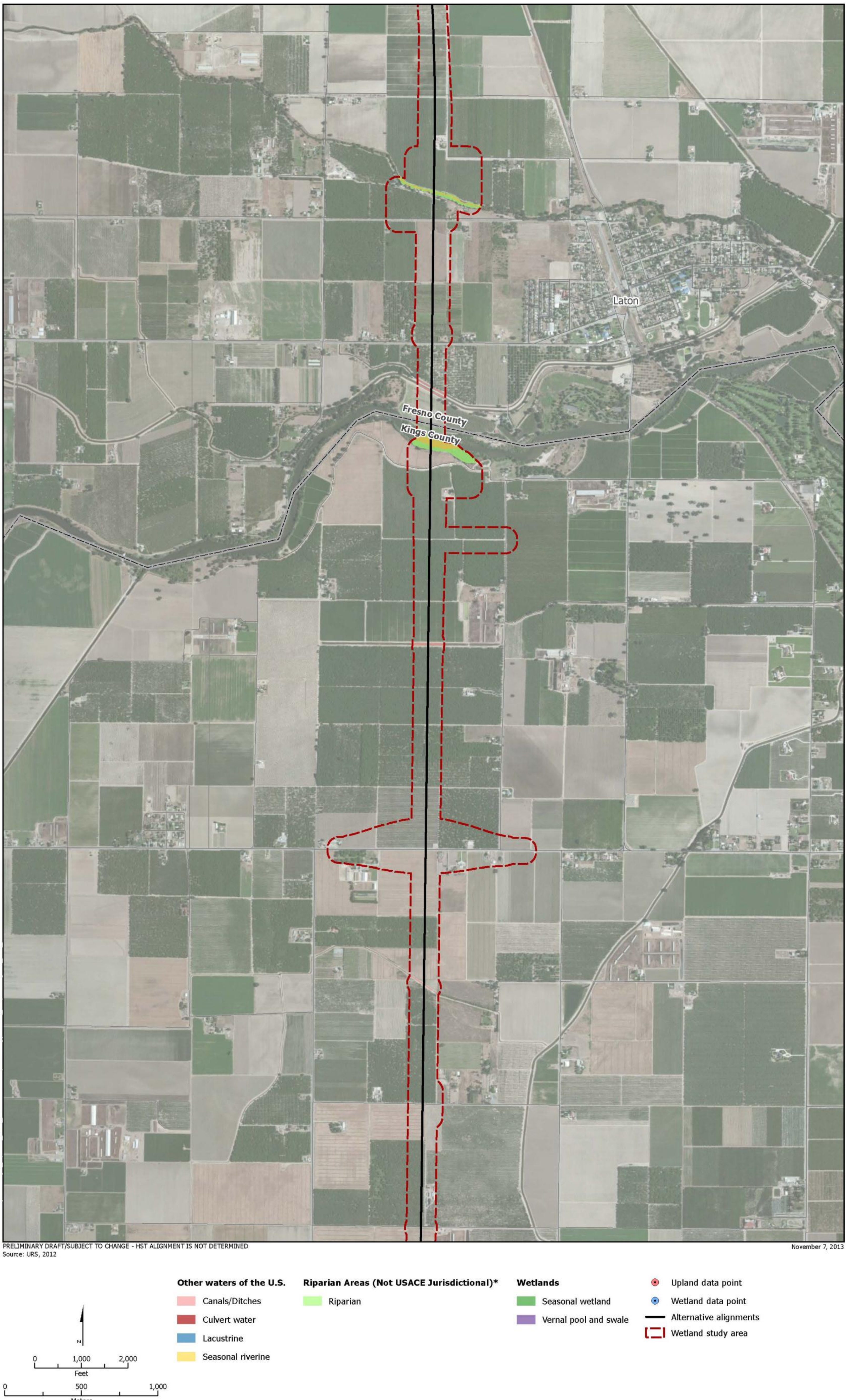


Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 9)

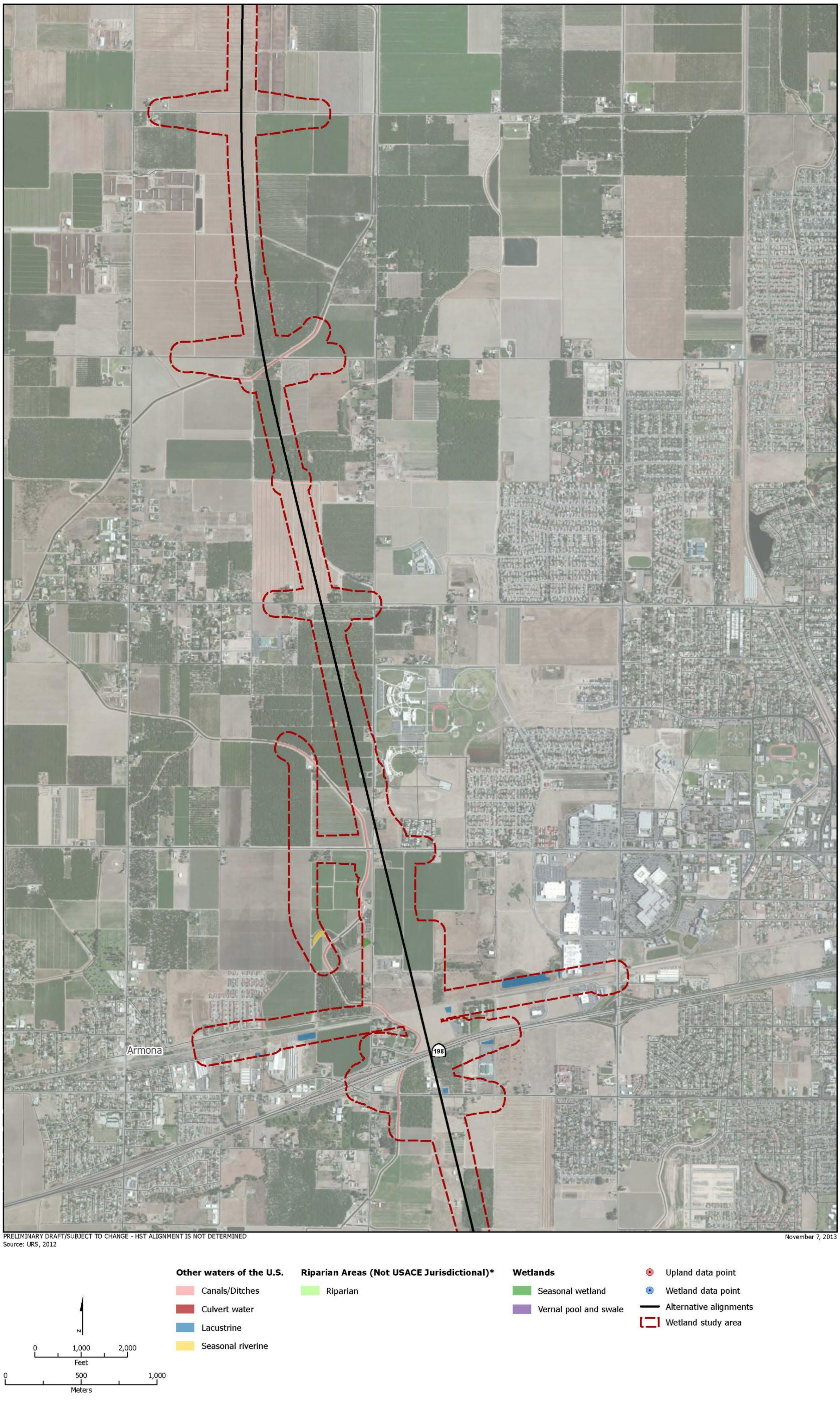
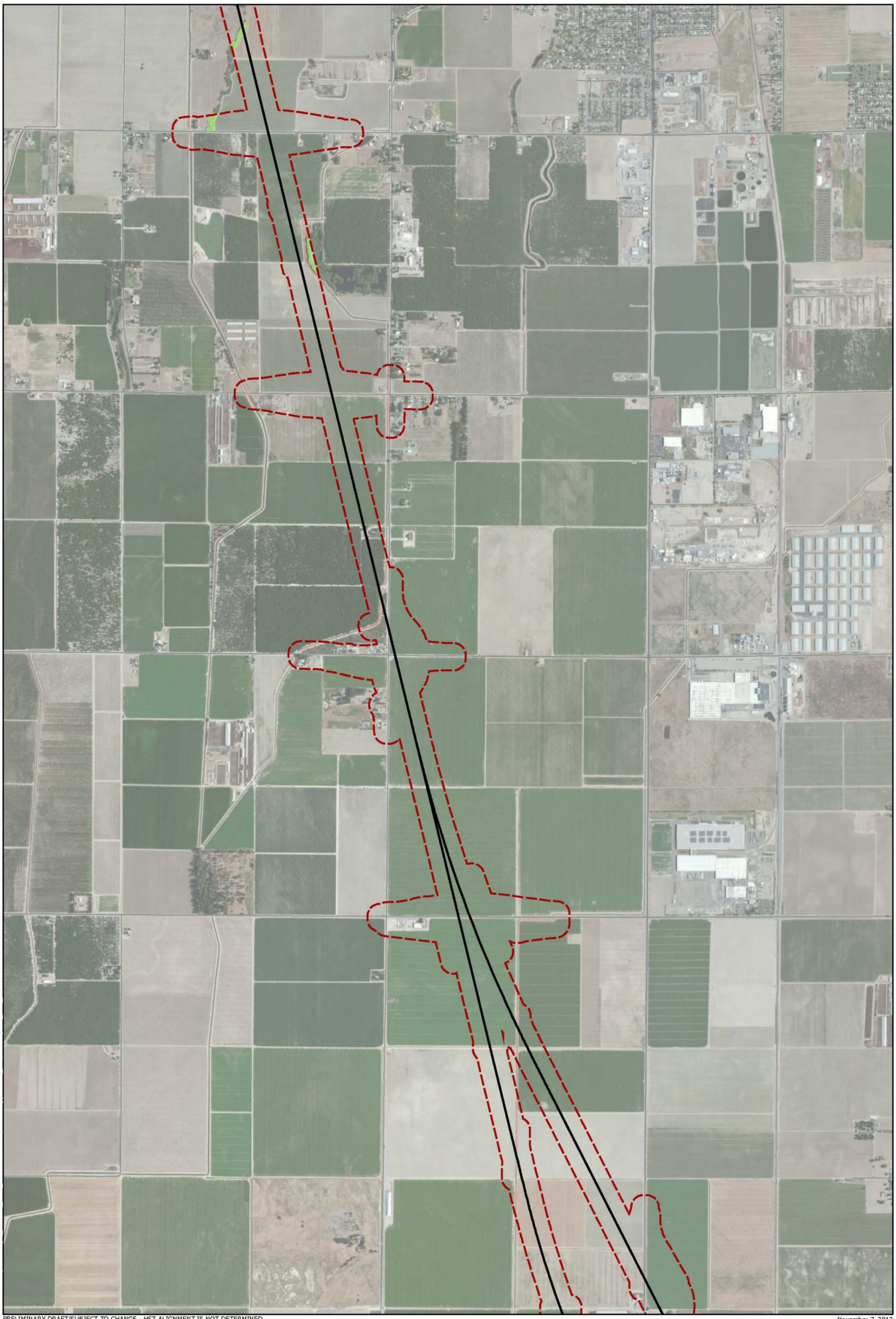


Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 10)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HST ALIGNMENT IS NOT DETERMINED
Source: URS, 2012

November 7, 2013

Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 11)

Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 12)

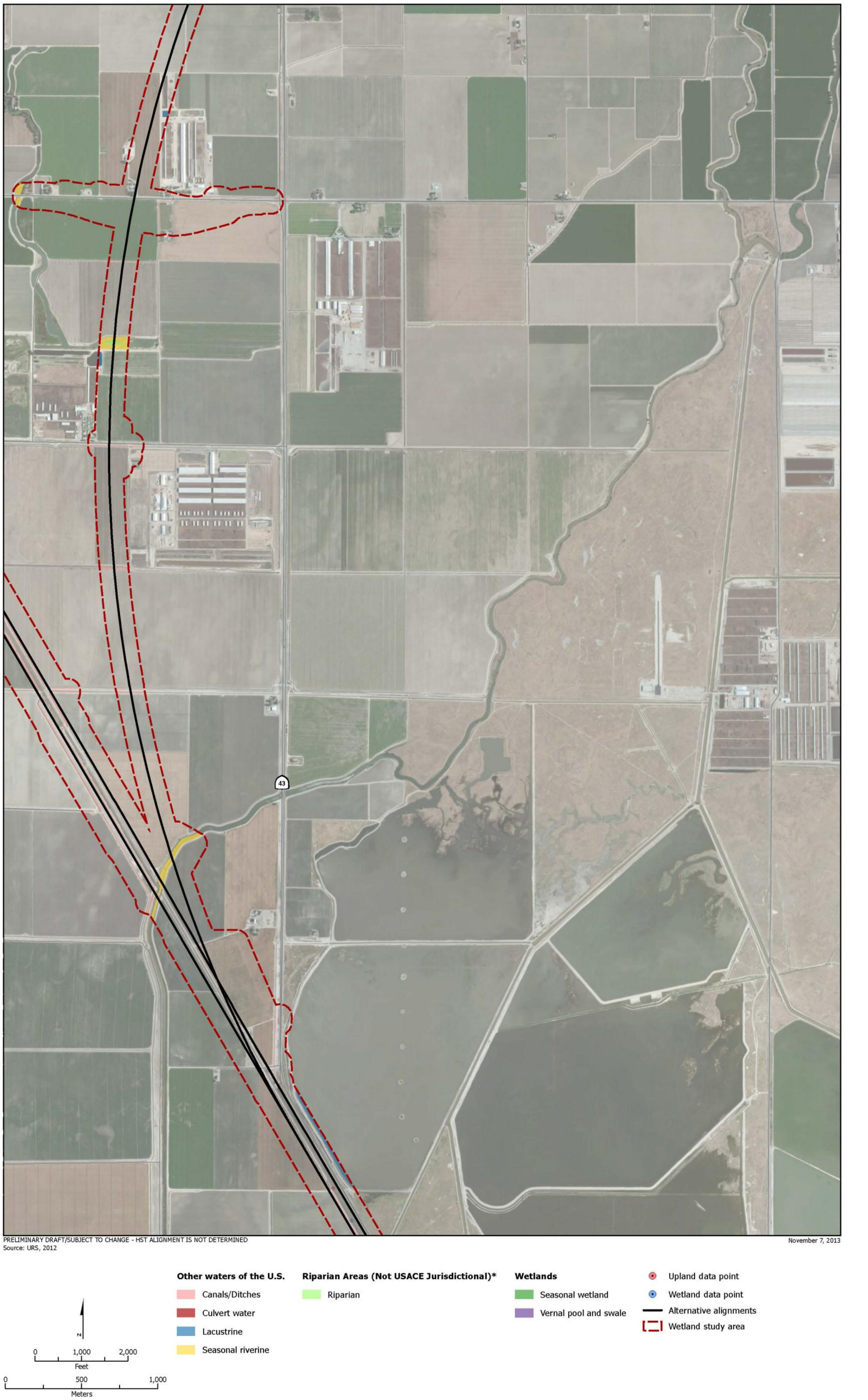


Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 13)

Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 14)

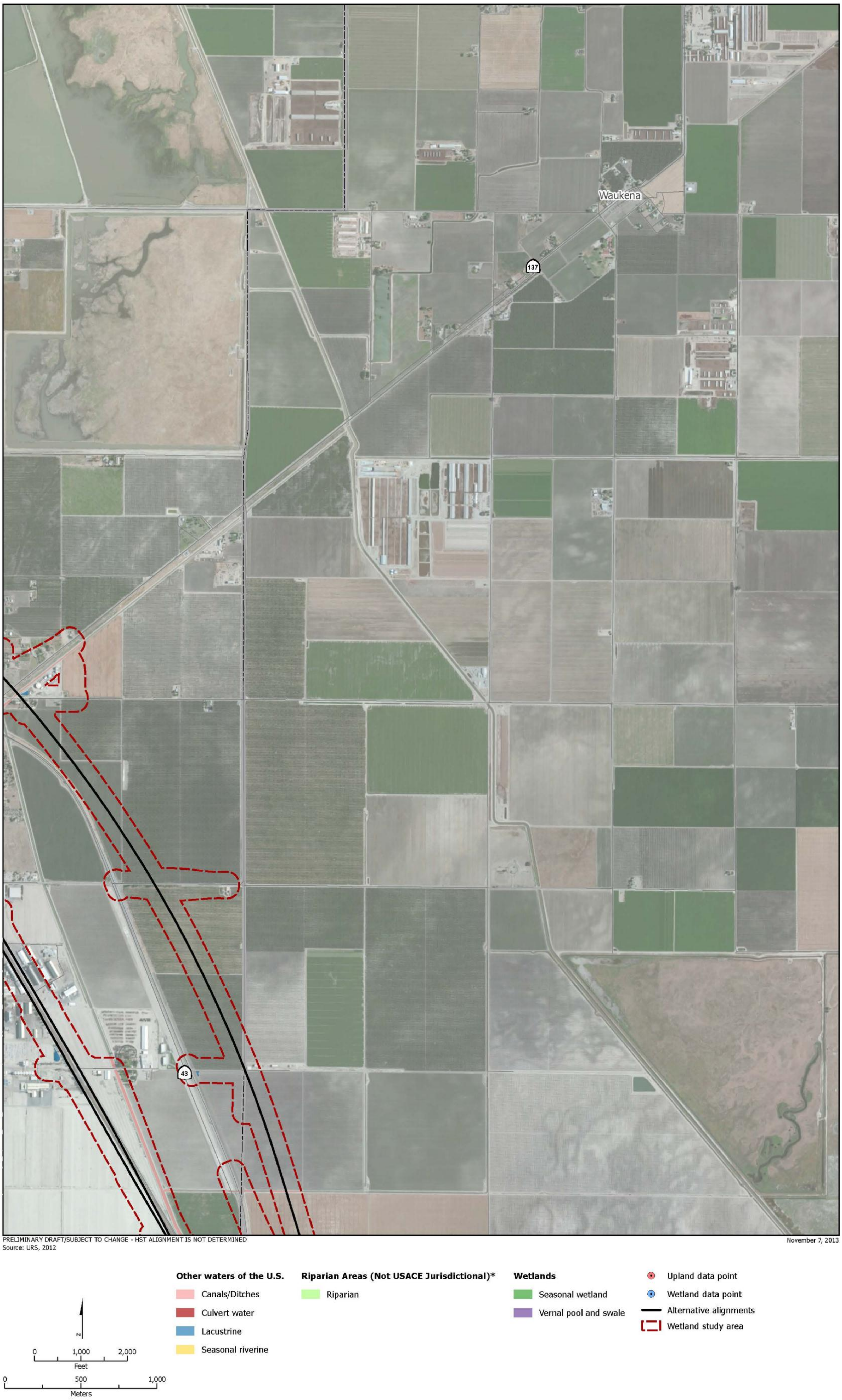
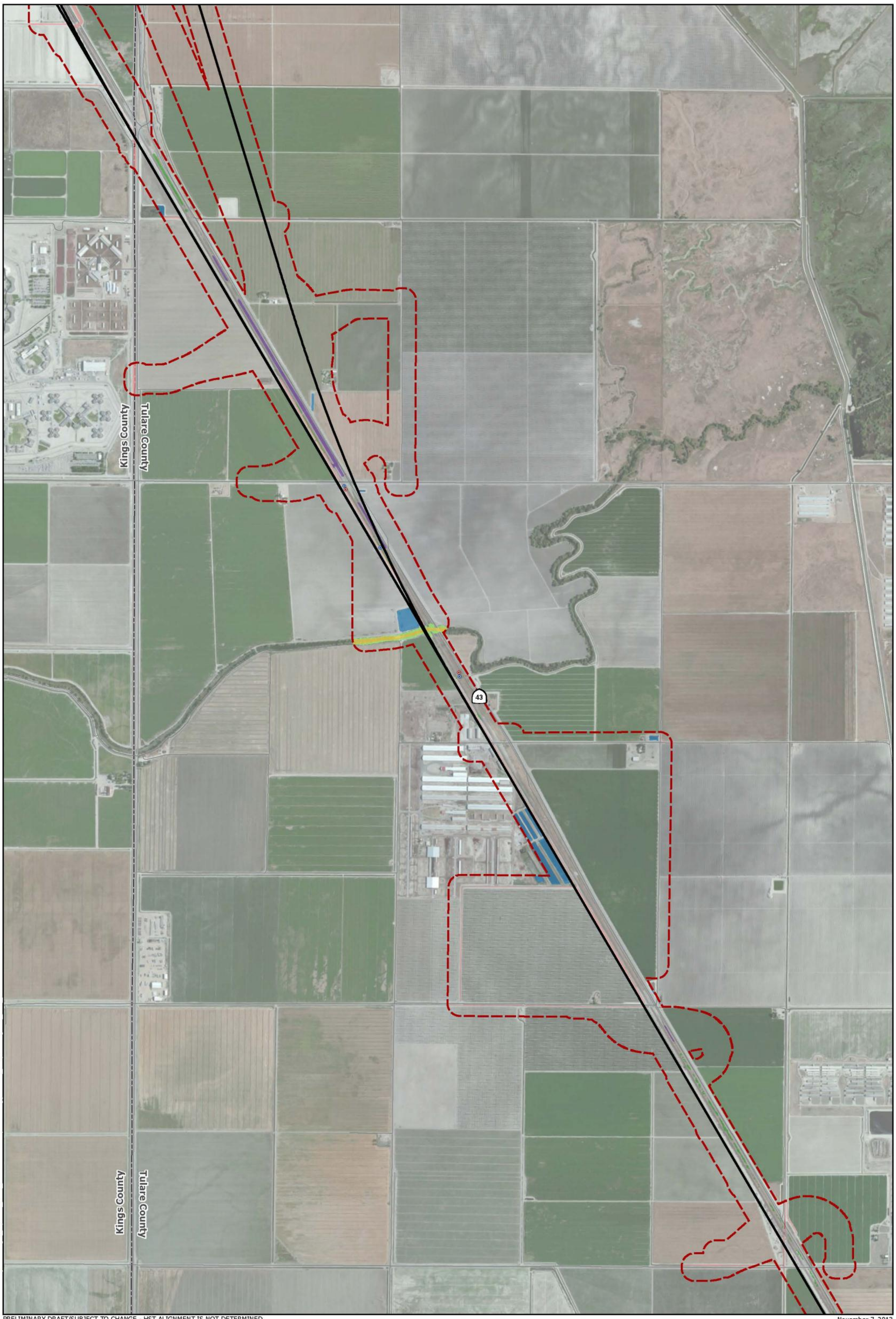


Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 15)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HST ALIGNMENT IS NOT DETERMINED
Source: URS, 2012

November 7, 2013

Other waters of the U.S.
- Canals/Ditches
- Culvert water
- Lacustrine
- Seasonal riverine

Riparian Areas (Not USACE Jurisdictional)*
- Riparian

Wetlands
- Seasonal wetland
- Vernal pool and swale

- Upland data point
- Wetland data point
- Alternative alignments
- Wetland study area

N

0 1,000 2,000
Feet

0 500 1,000
Meters

Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 16)

CALIFORNIA High-Speed Rail Authority
U.S. Department of Transportation Federal Railroad Administration

Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 17)

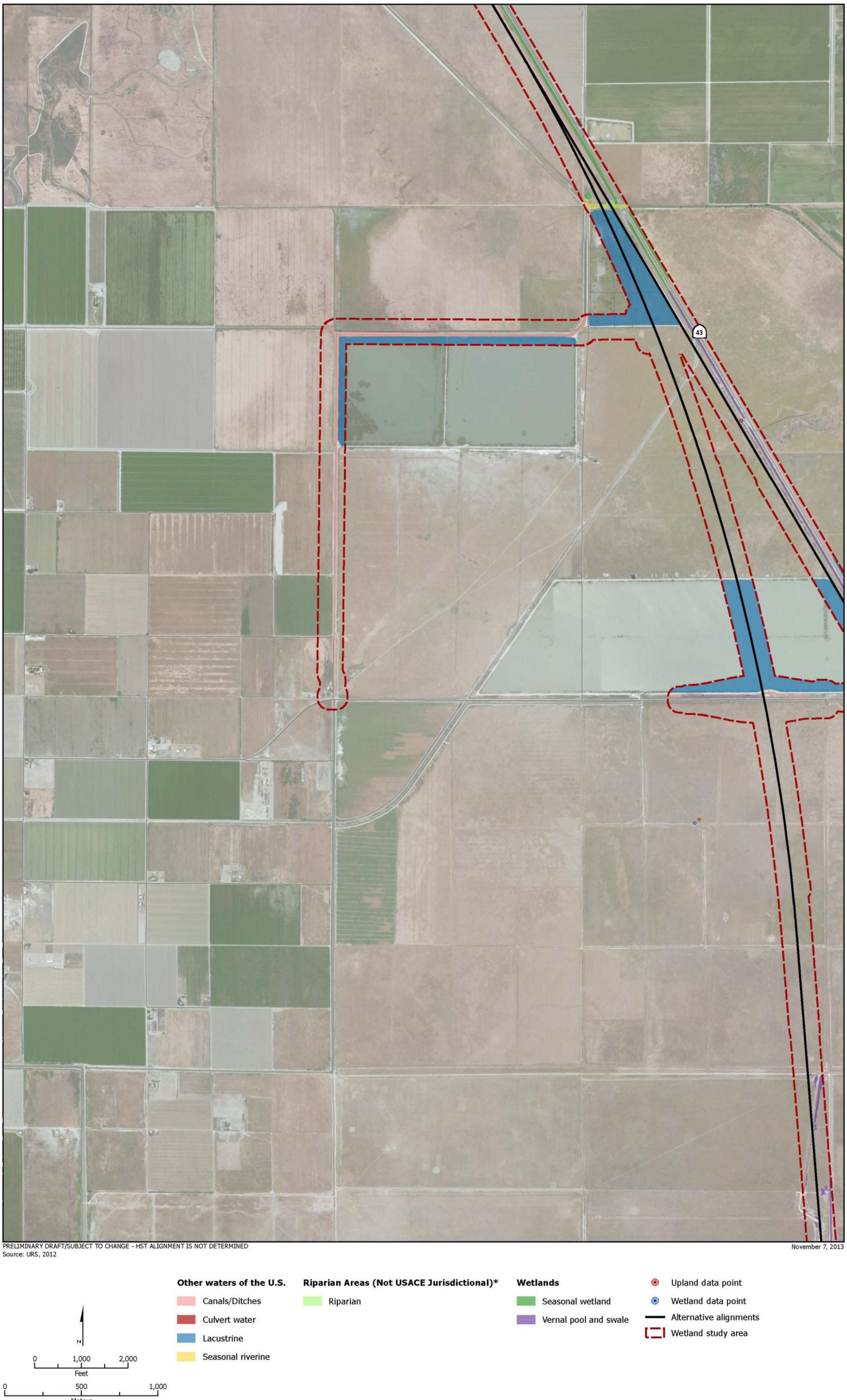
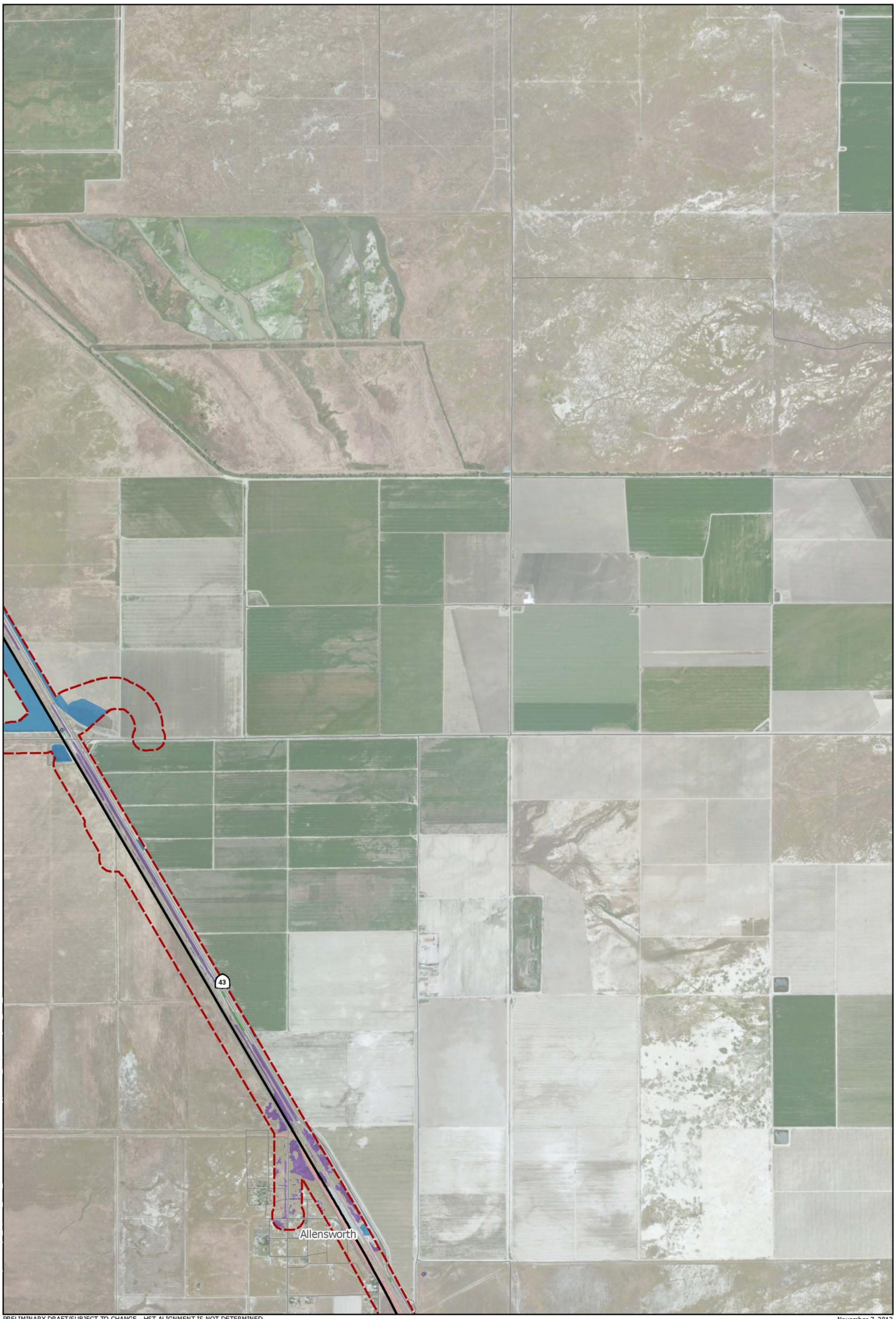
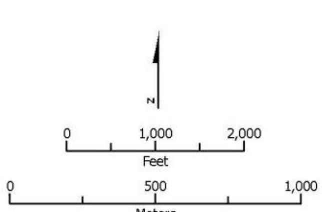


Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 18)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HST ALIGNMENT IS NOT DETERMINED
Source: URS, 2012

November 7, 2013



Other waters of the U.S.
- Canals/Ditches
- Culvert water
- Lacustrine
- Seasonal riverine

Riparian Areas (Not USACE Jurisdictional)*
- Riparian

Wetlands
- Seasonal wetland
- Vernal pool and swale

- Upland data point
- Wetland data point
- Alternative alignments
- Wetland study area

Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 19)

Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 20)

Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 21)

Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 22)

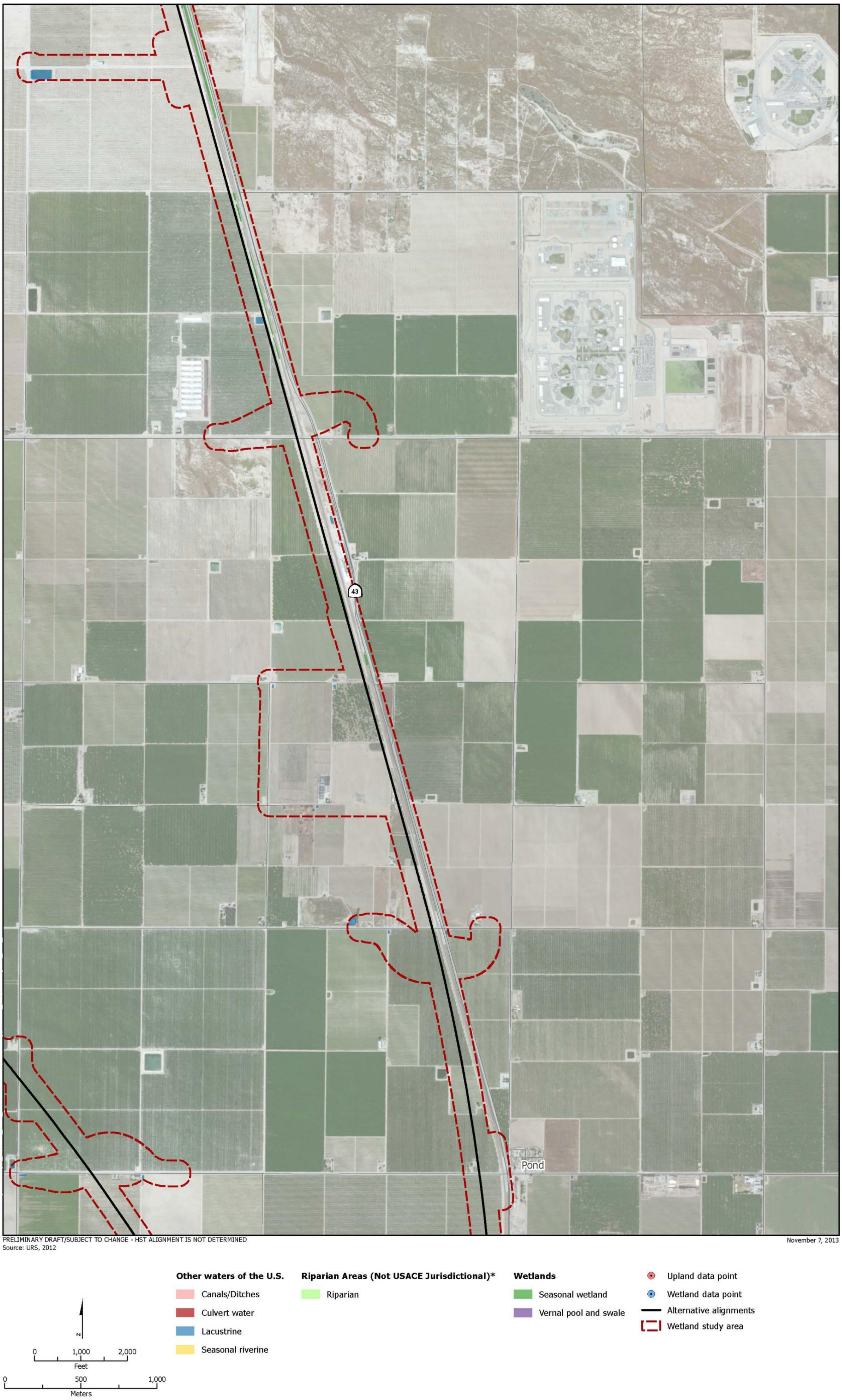


Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 23)

Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 24)

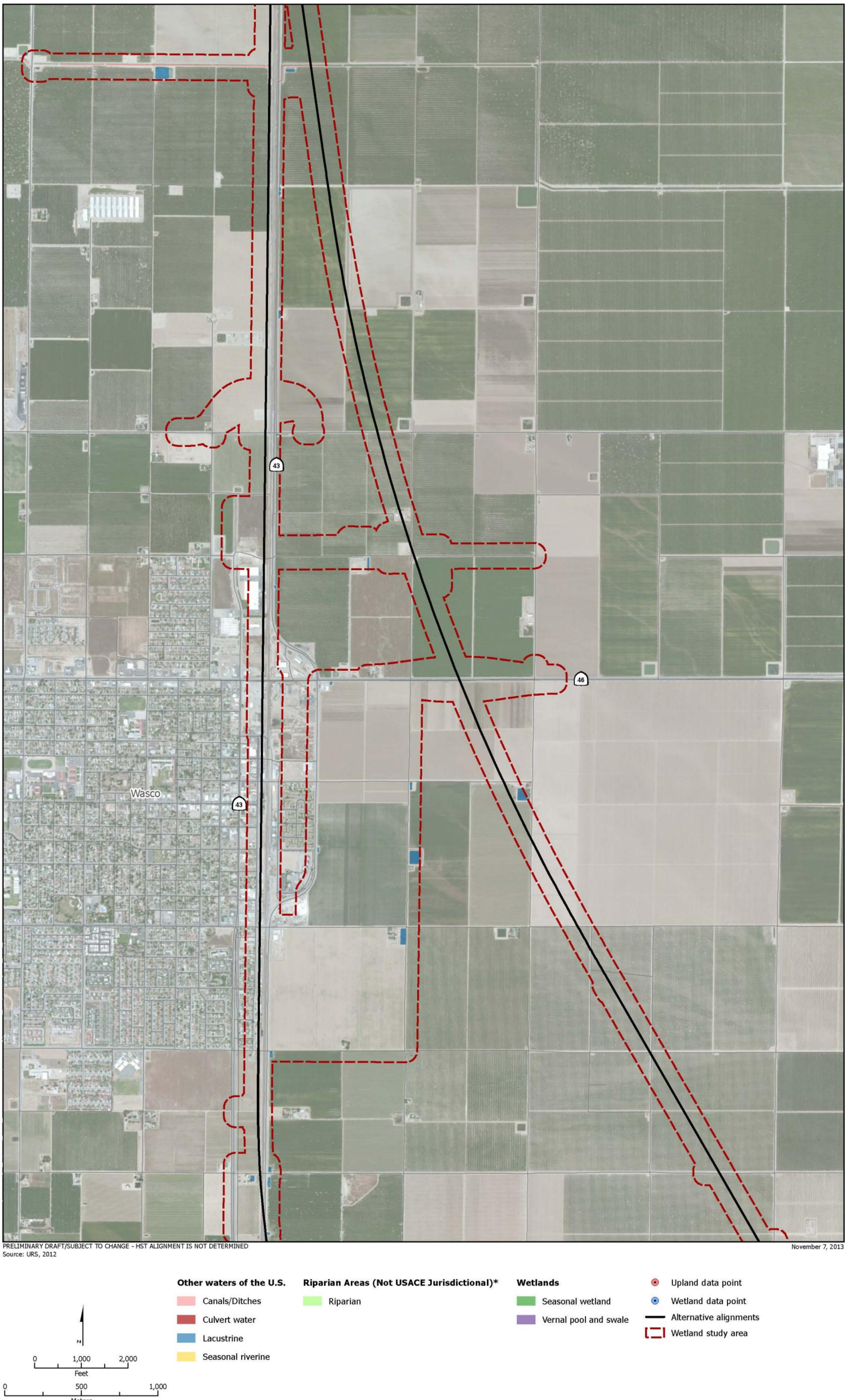


Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 25)

PRELIMINARY DRAFT/SUBJECT TO CHANGE - HST ALIGNMENT IS NOT DETERMINED
Source: URS, 2012

November 7, 2013

Other waters of the U.S.
- Canals/Ditches
- Culvert water
- Lacustrine
- Seasonal riverine

Riparian Areas (Not USACE Jurisdictional)*
- Riparian

Wetlands
- Seasonal wetland
- Vernal pool and swale

- Upland data point
- Wetland data point
- Alternative alignments
- Wetland study area

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Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 26)

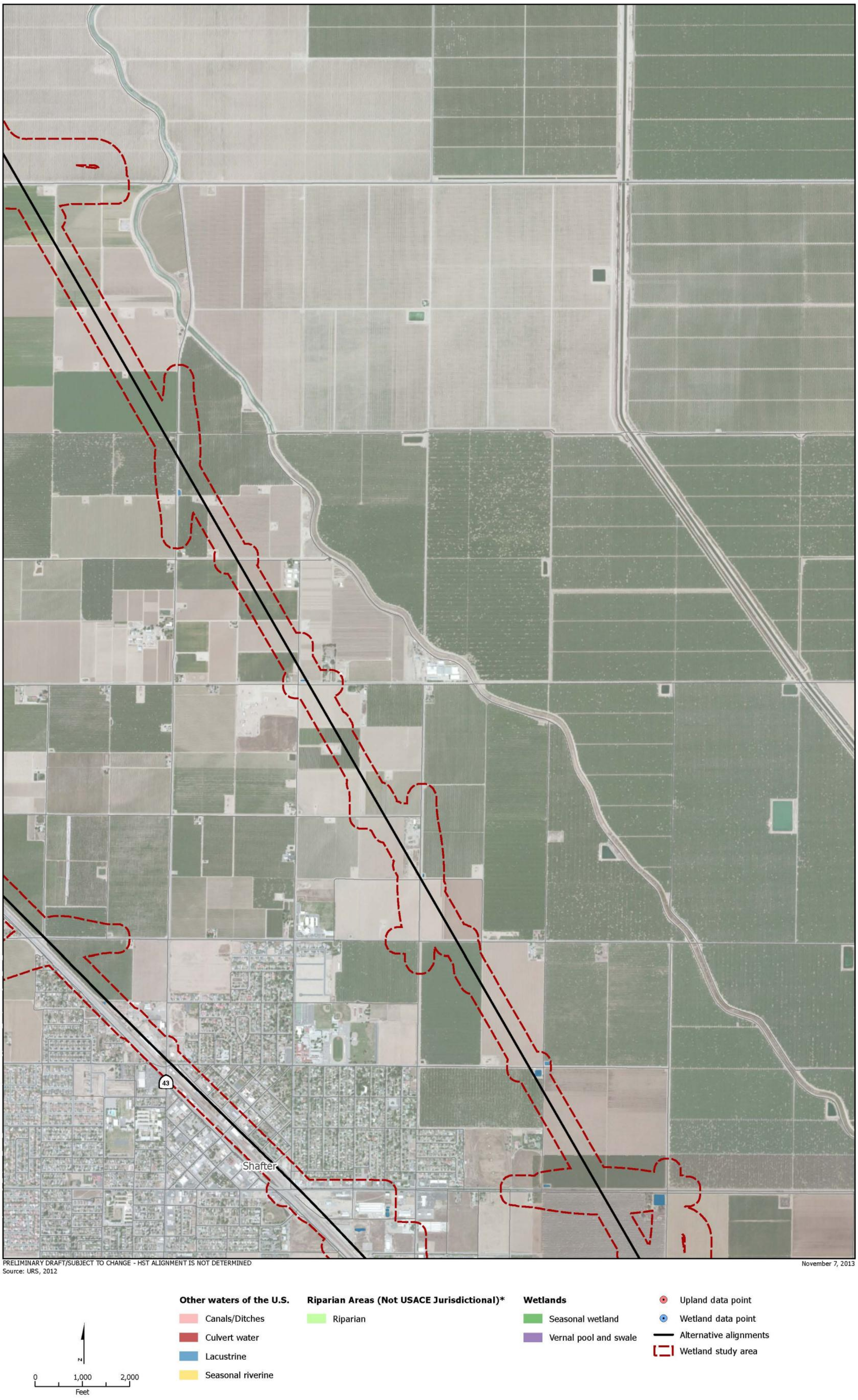


Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 27)

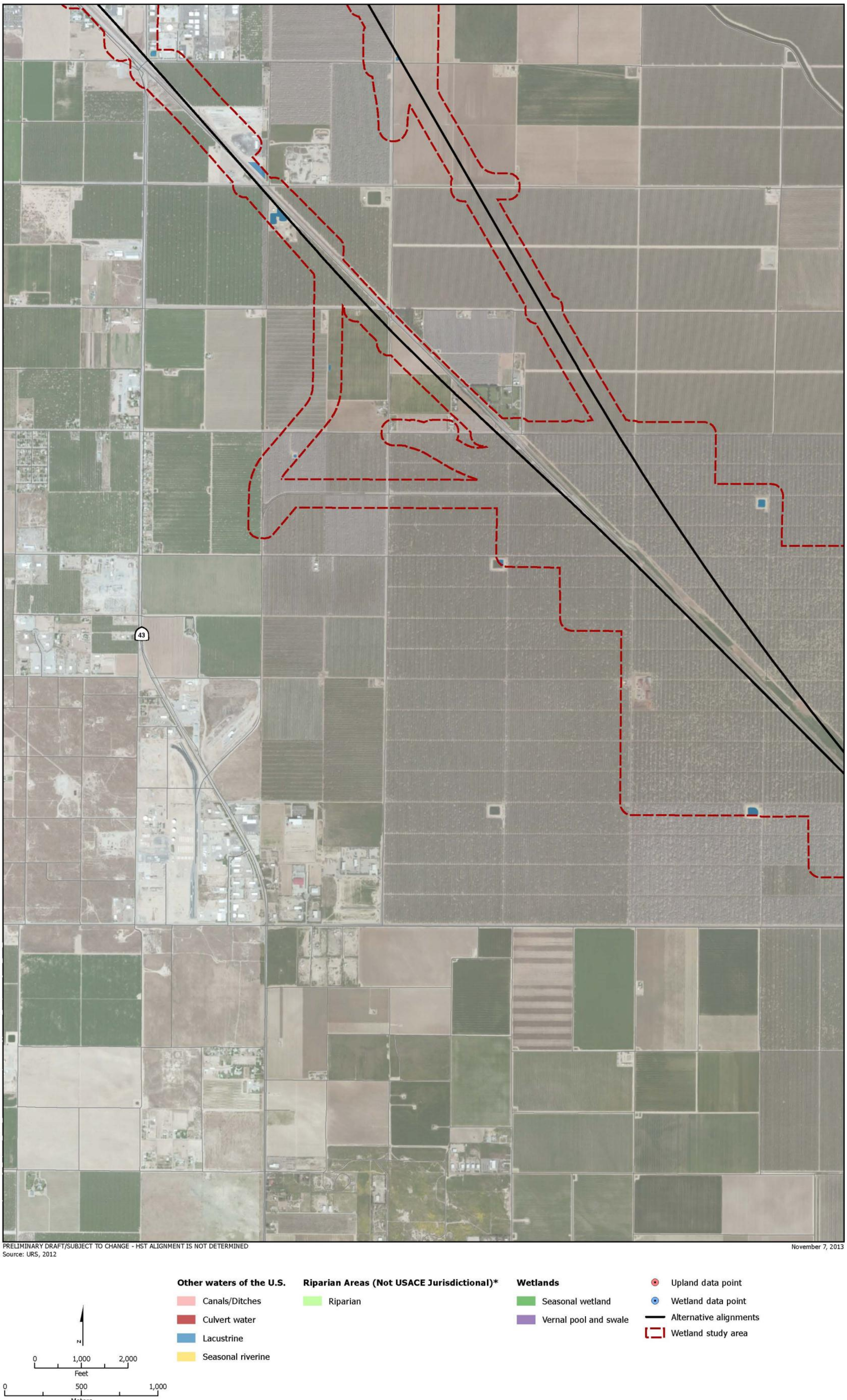


Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 28)

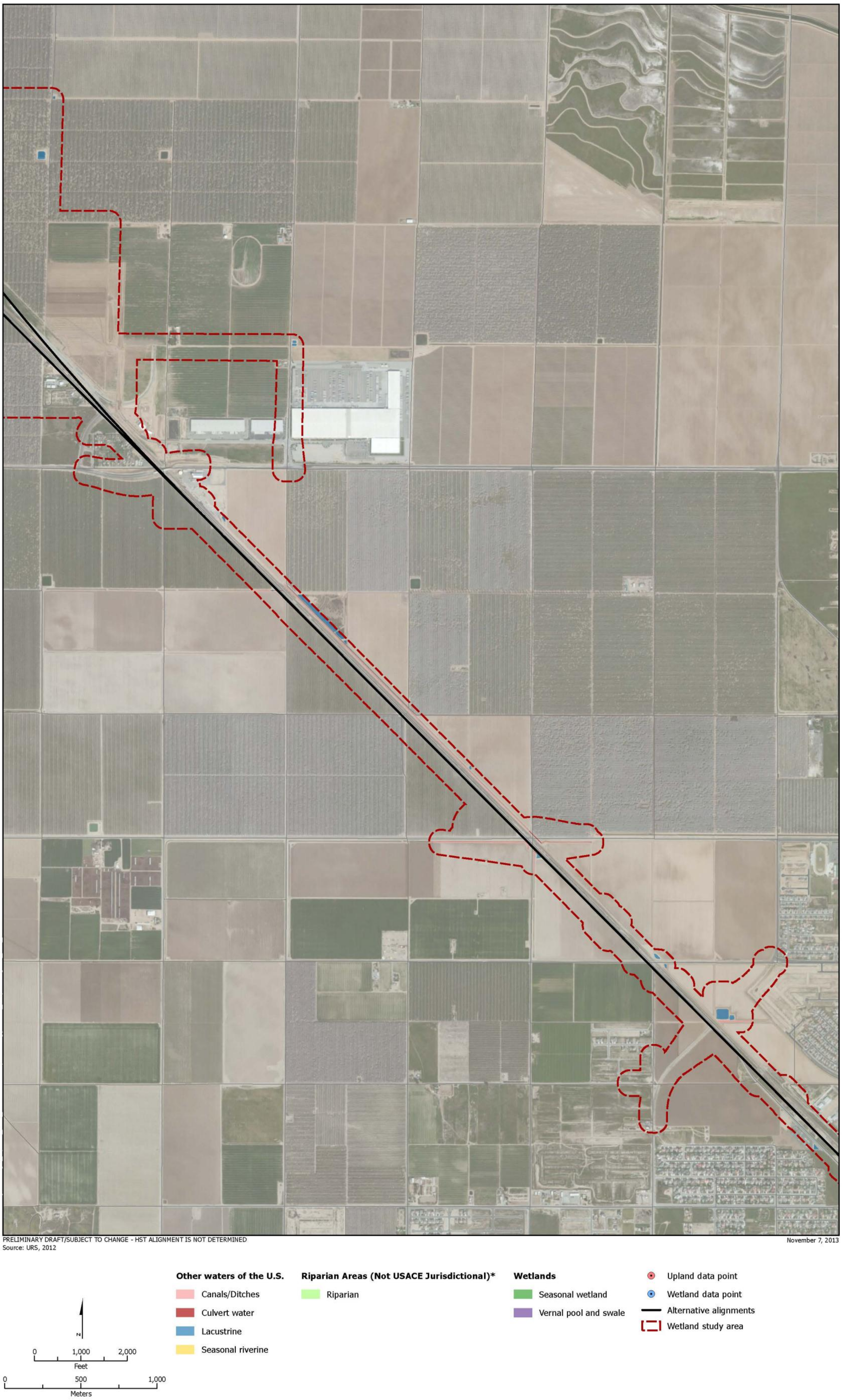
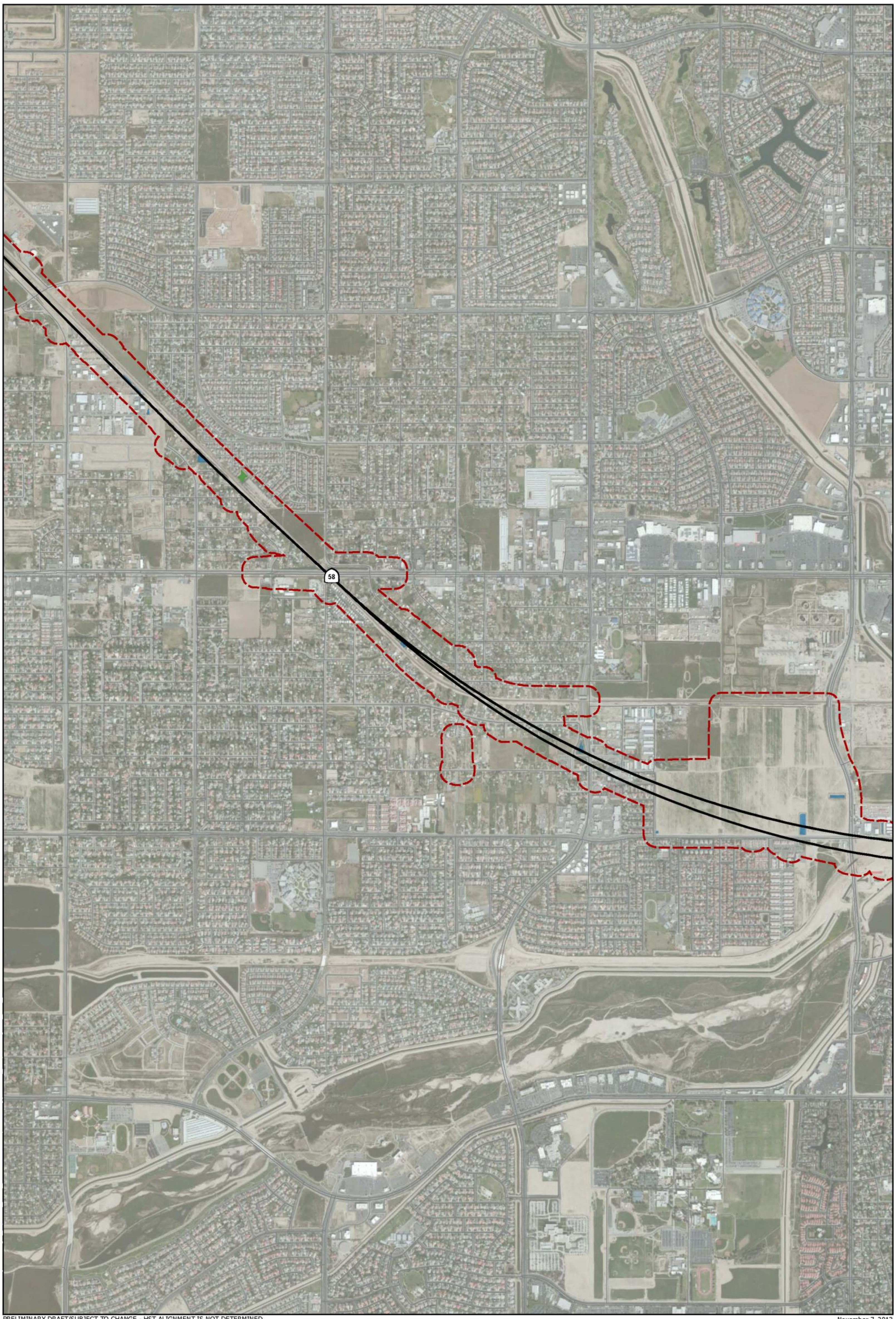


Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 29)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HST ALIGNMENT IS NOT DETERMINED
Source: URS, 2012

November 7, 2013

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Feet

0 500 1,000
Meters

Other waters of the U.S.
- Canals/Ditches
- Culvert water
- Lacustrine
- Seasonal riverine

Riparian Areas (Not USACE Jurisdictional)*
- Riparian

Wetlands
- Seasonal wetland
- Vernal pool and swale

- Upland data point
- Wetland data point
- Alternative alignments
- Wetland study area

Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 30)

CALIFORNIA High-Speed Rail Authority
U.S. Department of Transportation Federal Railroad Administration

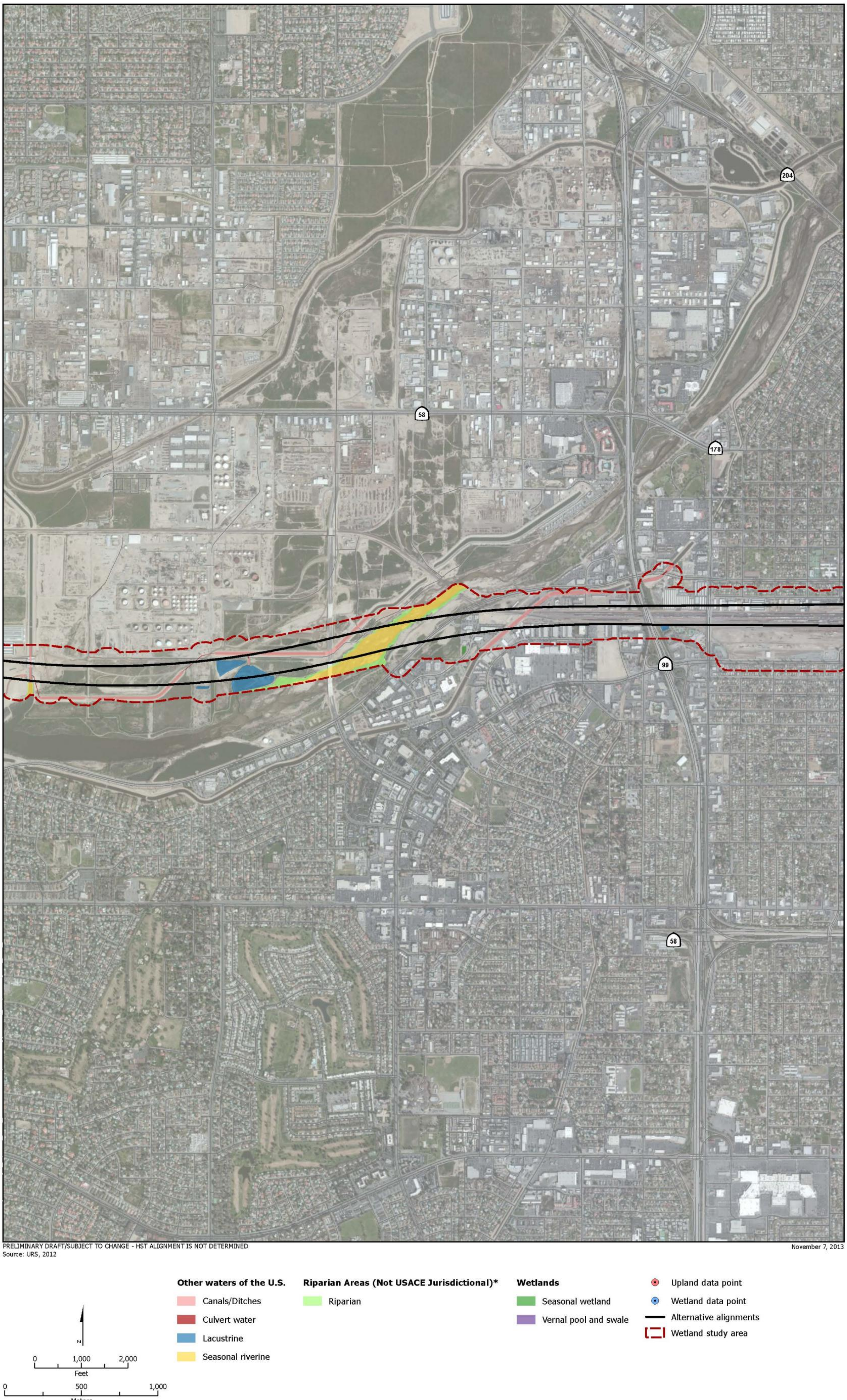

Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 31)

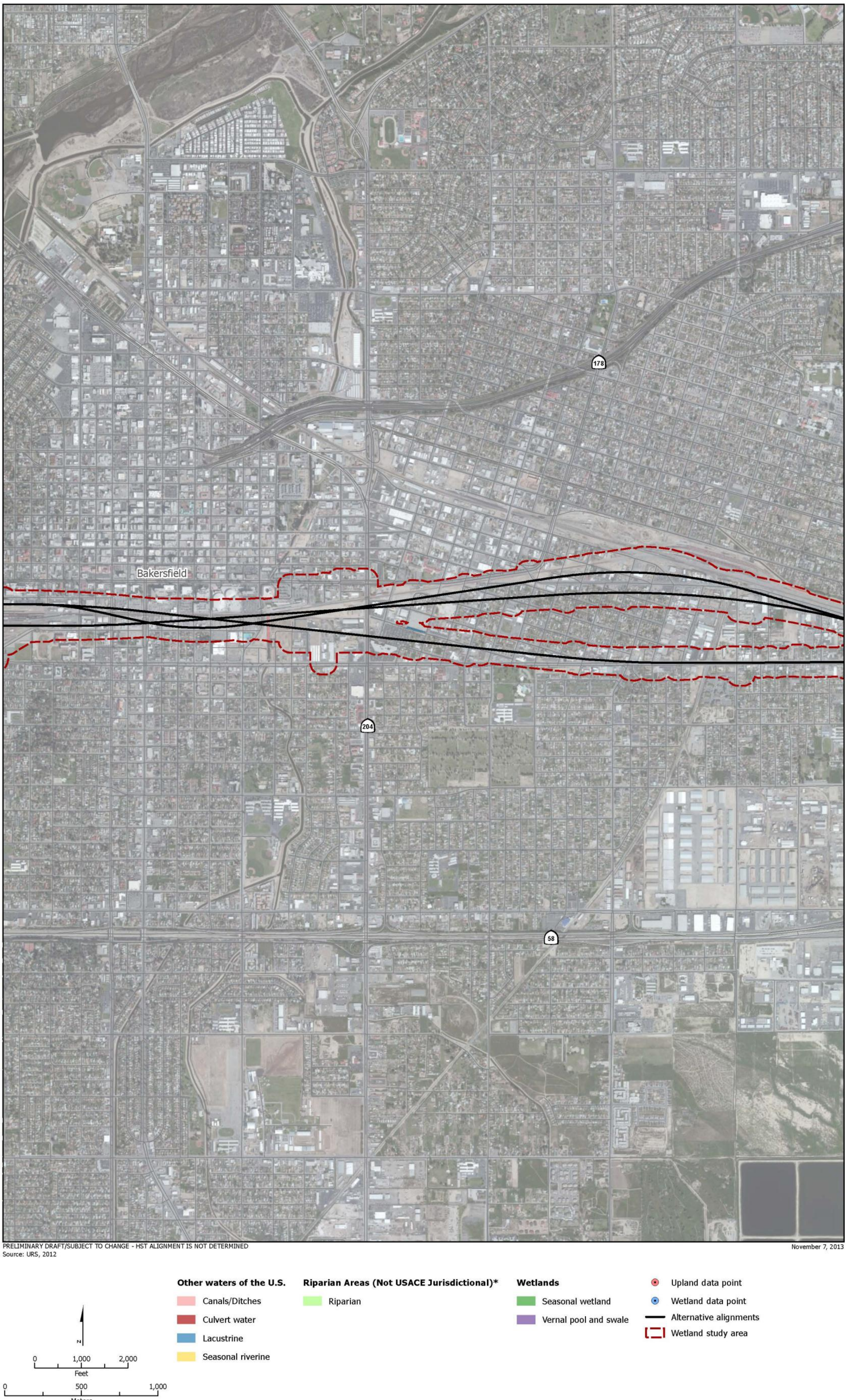

Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 32)

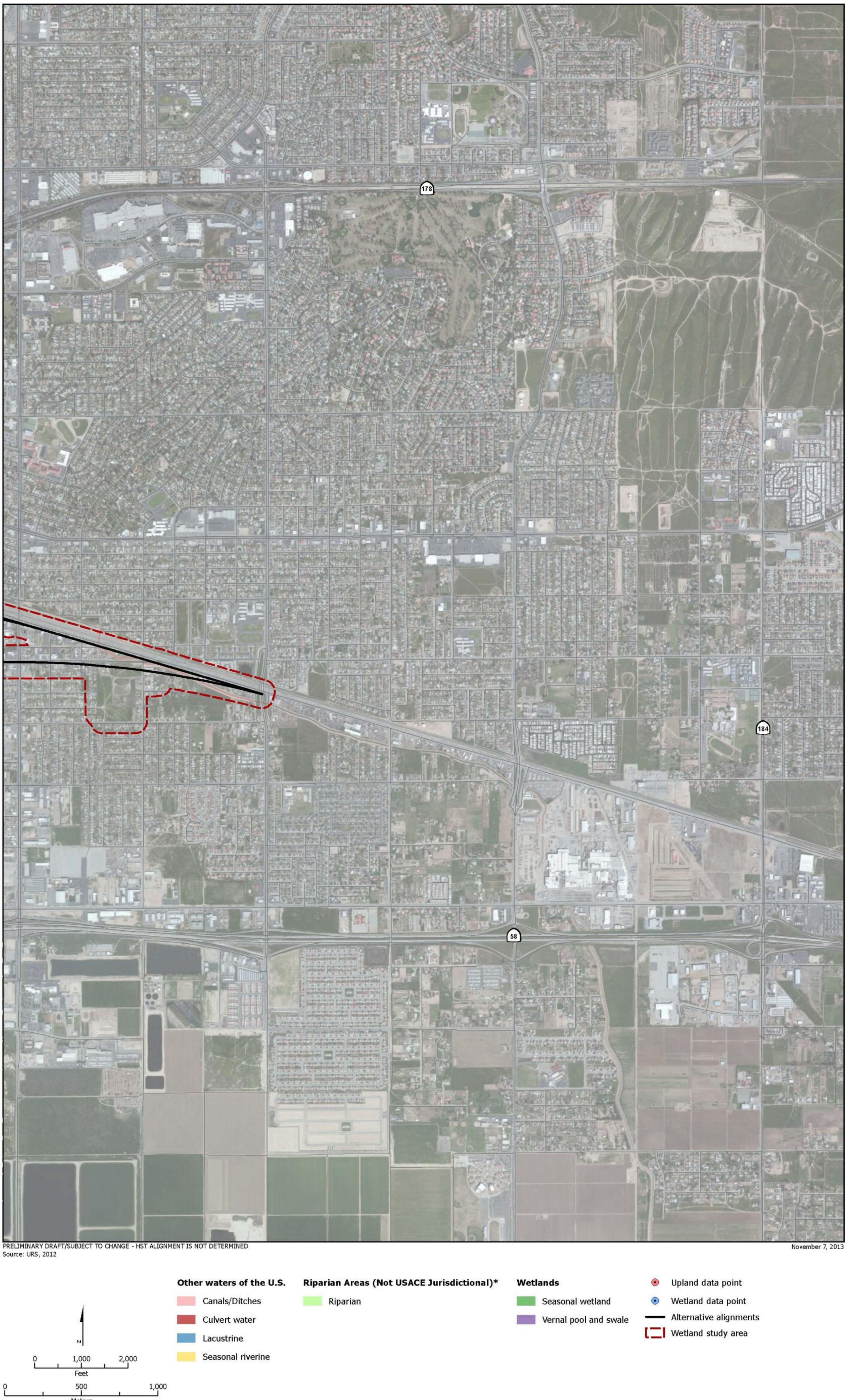

Figure 4-7
Jurisdictional waters delineation and riparian areas (Sheet 33)

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Many of the jurisdictional waters in the study area have been leveled, drained, and/or leveed for agricultural purposes (to prevent flooding). The physical and biological characteristics of the substrate within various features are largely dictated by whether the feature is manipulated or natural.

Manipulated features include all jurisdictional water features except vernal pools and swales. These manipulated features contain substrates that have been altered through excavation, filling, dredging and accretion of sediments; these substrates typically range from sandy and coarse-loamy to fine-silty, fine-loamy, and fines (depending on location in the study area). Natural features such as vernal pools and swales have substrates composed of natural alkaline soils, which are harsh environments for microbes and plants and contain low levels of organic matter.

Jurisdictional waters are described in more detail in the *Fresno to Bakersfield Section: Biological Resources and Wetlands Technical Report* (Authority and FRA 2012b) and in the *Fresno to Bakersfield Section: Revised Draft EIR / Supplemental Draft EIS* (Authority and FRA 2012a), which provides detailed descriptions of the major surface water features found in the region. The special aquatic resources present in the study area are listed in Table 4-2.

Table 4-2
Special Aquatic Resources in the Study Area for the Fresno to Bakersfield Section

Special Aquatic Resource	Acres
Canals/ditches	199.55
Emergent wetland	0.92
Lacustrine	278.32
Riparian (not USACE jurisdictional)	51.82
Seasonal riverine	58.33
Seasonal wetland	43.56
Vernal pools and swales	95.86
TOTAL	**728.36**
Note: Study area includes the construction and project footprints plus a 250-foot buffer.	

4.2.2.1 Man-Made and Manipulated Aquatic Resources

Canals/Ditches

Canals and drainage and irrigation ditches occur throughout the study area. These man-made or manipulated linear features are concrete-lined or unlined and earthen and range from approximately 10 to 50 feet in width. Canals/ditches are primarily used to transport water for irrigation and agricultural purposes; however, some features provide drainage in a non-agricultural setting. These features are typically devoid of vegetation and lack natural soils, though sediments often deposit at the bottom of the canal or ditch. A series of pumps is often used to transport water between canals, ditches, or under roads and other infrastructure. In general, canals/ditches are in relatively poor ecological condition due to poor landscape position, have a highly manipulated hydrological regime, offer few biological resources to plants and wildlife, and are physically engineered to the extent that they are devoid of natural characteristics.

Emergent Wetland

Emergent wetlands occur in two locations: (1) near the city of Hanford and (2) in Bakersfield. They are characterized by topographic depressions that flood frequently or hold ponded water long enough to support hydrophytic vegetation; they typically feature hydric soils. The presence of vegetation separates emergent wetland features from lacustrine features. The emergent wetlands in the study area appear to be man-made or highly manipulated. They are bounded by earthen walls and receive hydrologic input from surrounding canals, agricultural fields, and urban development. Two emergent wetlands occur near Hanford. One is within the footprints of the Hanford West Bypass 1 and 2 alternatives in a large depression surrounded by riparian vegetation. This emergent wetland appears to receive input from the adjacent canal and may be a remnant of a historical natural drainage system. This emergent wetland offers some habitat for wading birds and waterfowl. The other emergent wetland in the Hanford area occurs outside the project footprints but within the study area. It is adjacent to a dairy farm feedlot and appears to receive inflow from the basins at the feed lot and Guernsey Slough. The emergent wetland in Bakersfield also occurs outside the project footprint but within the study area. It comprises a vegetated portion of a basin. In general, the emergent wetlands are in poor to fair ecological condition due to a poor landscape position, have a highly manipulated hydrologic regime, offer few biological resources to plants and wildlife, and are physically engineered to the extent that they retain few natural characteristics.

Lacustrine

Lacustrine features include retention/detention basins and reservoirs. These features occur throughout the study area. Retention/detention basins are man-made features that are square, rectangular, round, or triangular; are often found with constructed earthen walls; and are devoid of vegetation. These features are closely associated with agriculture activities and in most instances are used as water storage (or retention) facilities. In urban areas, retention/detention basins are used to retain urban storm-water runoff. Surface water in the basins may be seasonal or perennial, depending on the location and the use of the feature. Reservoirs are large, steep-sided, man-made impoundments that may contain either drinking water or irrigation water storage. Reservoirs are similar to, but generally larger than, retention/detention basins. One of reservoirs is the Tulare Lake Bed Mitigation Site, which was developed and is maintained by the Kaweah Delta Water Conservation District for waterfowl. All of the reservoirs are large, perennially open-water features devoid of vegetation; however, these features provide important habitat for wading birds and waterfowl. In general, lacustrine features are in relatively poor ecological condition due to a disturbed environmental setting; have a highly manipulated hydrological regime, offer few biological resources to plants and wildlife, and are physically engineered to the extent that they are devoid of natural characteristics.

Seasonal Wetland

Seasonal wetlands occur in scattered locations throughout the study area, but are concentrated in the area between the cities of Corcoran and Wasco. The majority of the seasonal wetlands in the study area were found within the BNSF right-of-way. They typically occur in disturbed habitats, including fallow agricultural areas, drainage ditches along the BNSF right-of-way, the margins of retention/detention basins, active agricultural fields, and roadside ditches. Seasonal wetlands are predominantly vegetated with hydrophytic plants, occur in topographic depressions, and have soils with sufficient clay content or compaction to support seasonal ponding. In manipulated areas, inundation is hydrologically controlled by pumps, weirs, and/or storm drain systems year-round. In more natural areas, inundation or saturation occurs during the winter and spring seasons as the result of rainfall and surface runoff. During the summer and fall months, seasonal wetlands are dry. Although they share a similar hydrologic regime, seasonal wetlands are distinguished from vernal pools by their lack of the distinctive floristic components and

distinctive claypans or hardpans. In general, seasonal wetlands are in relatively fair ecological condition due to a poor landscape position, function with altered and natural hydrological regimes, provide some biological resources to plants and wildlife, and are physically altered, which reduces their natural characteristics.

4.2.2.2 Sensitive Aquatic Resources

Sensitive aquatic resources are those aquatic features that generally occur in more natural settings and are characterized by primarily natural sources of hydrology. These features are the most sensitive to impacts and provide unique functions and services not easily replaced by other special aquatic resources.

Seasonal Riverine

Seasonal riverine waterways occur as discrete features throughout the study area. They include Kings River Complex, Mussel Slough, Oak Slough, Cross Creek, Tule River, Deer Creek, Poso Creek, Kern River, and other unnamed waterways. Many of these features originate in the Sierra Nevada, where their hydrology is less affected by water developments. Although their hydrology is affected by water storage and hydroelectric development in their headwaters, the upper reaches of these streams are less affected by water developments than the reaches in the study area. By the time these features reach the study area, they are highly manipulated for municipal and agricultural purposes and much of their surface water and groundwater have been diverted, pumped, or captured.

The banks and floodplains of many seasonal riverine waterways in the study area have been channelized, and extensive adjacent riparian vegetation has been removed or confined by surrounding land use. Typically, these features are seasonally dry and have streambeds that are unvegetated and consist of coarse sand or gravel. For these reasons, seasonal riverine features are in fair to good ecological condition due to landscape positions that have connectivity upstream and downstream. They function with altered and natural hydrological regimes, provide some biological resources to plants and wildlife, and are physically altered, which reduces their natural characteristics.

Kings River

The Kings River originates in the Sierra Nevada and flows southwest approximately 125 miles to the Tulare Lake bed. The north, middle, and south forks of the Kings River converge in the foothills upstream of Pine Flat Dam. Pine Flat Reservoir (also referred to as Pine Flat Lake) provides 475,000 acre-feet of flood control storage. Upstream of Pine Flat Dam, the Kings River drains approximately 1,545 square miles (USACE 1999). Downstream of the dam, the Kings River flows through canals and levee systems and splits into multiple channels as water is diverted for irrigation and flood control in the valley.

The middle and south forks of the Kings River, which are within Kings Canyon National Park, are designated as wild and scenic. These reaches of the river are about 50 miles east of the project alternative alignments.

Approximately 1 mile downstream of SR 99 (and 8 miles upstream of where the BNSF Alternative crosses Cole Slough), People's Weir spans the Kings River and diverts water into the Lakeland Canal and Peoples Ditch. Large floods in the 1860s carved a new channel for the Kings River below People's Weir, and Cole Slough became the main channel. The old channel, known as Old River, is usually dry. About 2 miles above where the BNSF Alternative crosses Cole Slough, the channel is divided into Dutch John Slough and Cole Slough by the Dutch John Weir. Water is diverted down each channel, Cole Slough, or Dutch John Slough, depending on water demands.

Cole Slough rejoins Old River at Reynolds Cut, less than 3 miles below where the BNSF Alternative crosses Cole Slough. Reynolds Weir controls flow into Murphy Slough, Liberty Canal, and Grant Canal. The Hanford West Bypass 1 and 2 alternatives cross Murphy Slough, Grant Canal, and the Kings River approximately 2 miles downstream of Reynolds Weir.

Dutch John Cut joins Old River about 2 miles below where the BNSF Alternative crosses the Kings River (also known as Old River at this location). The flow through Dutch John Cut to the Old River becomes the main flow of the Kings River, which continues downstream. Flow from the Kings River eventually reaches the Tulare Lake bed (KRCD and KRWA 2009).

South of the Kings River crossing, the BNSF Alternative alignment crosses Riverside Ditch approximately 0.2 mile south of Old River. The Hanford West Bypass 1 and 2 alternatives cross Riverside Ditch approximately 1 mile south of Kings River.

Originating at People's Weir, Peoples Ditch conveys water southwest through the city of Hanford. The BNSF Alternative crosses Peoples Ditch approximately 3 miles northeast of Hanford, and the Hanford West Bypass 1 and 2 alternatives cross Peoples Ditch about 2 miles south of Hanford.

Last Chance Ditch conveys water southwest from Last Chance Weir, on the Kings River (or Old River) between Dutch John Cut and Reynolds Cut. The Hanford West Bypass 1 and 2 alternatives cross the West Main of Last Chance Ditch approximately 1 mile northwest of the Hanford. These ditches are irrigation canals.

Cross Creek

Cross Creek, a reach of the Kaweah River, is formed from the merging of Cottonwood Creek and St. Johns River in the eastern San Joaquin Valley. Cottonwood Creek flows from the foothills of the Sierra Nevada, and St. Johns River branches off the Kaweah River approximately 3 miles below Terminus Dam. Cross Creek flows southwest approximately 35 miles through Tulare and Kings counties to the Tulare Lake bed. The creek is a Central Valley Flood Protection Board (CVFPB)-designated floodway. Where the BNSF Alternative, the Hanford West Bypass 1 Alternative, and the Hanford West Bypass 2 Alternative cross it just north of the Tulare Lake Bed Mitigation Site and east of SR 43, an encroachment permit from the CVFPB would be required before any work could be conducted at this crossing.

The Tulare Lake Bed Mitigation Site (also known as the Corcoran Reservoir) is approximately 3 miles north of Corcoran and just south of Cross Creek. The BNSF Alternative, the Hanford West Bypass 1 Alternative, and the Hanford West Bypass 2 Alternative would pass adjacent to the northwestern portion of this feature. The Corcoran Elevated and Corcoran Bypass alternatives begin near the Tulare Lake Bed Mitigation Site. The reservoir is operated by the Corcoran Irrigation District and is used for storage and recharge.

At the northeastern city limit of Corcoran, the Corcoran Bypass Alternative would cross Sweet Canal and the BNSF Alternative, and the Corcoran Elevated Alternative would cross Sweet Canal at the southern city limit of Corcoran. This canal is used for distribution of irrigation water and generally runs north to south.

The Lakeland Canal conveys water north to south to the east of the BNSF Alternative near Cross Creek and Corcoran. The Lakeland Canal would cross the BNSF Alternative at two locations: approximately 3 miles northwest of Corcoran and approximately 10 miles southeast of Corcoran.

Tule River

The Tule River originates in the Sierra Nevada and flows to Lake Success before entering the valley. The north, middle, and south forks of the Tule River converge in the foothills upstream of

Lake Success, the lake formed by Success Dam with a capacity of 82,300 acre-feet. The Tule River drainage area upstream from Success Dam covers approximately 393 square miles (USACE 1999). From Lake Success, the Tule River flows generally westward across the valley floor to the Tulare Lake bed. Stream flow data for the Tule River were collected at a USGS gauging station below Success Dam and are summarized in the *Fresno to Bakersfield Section: Hydrology and Water Quality Technical Report* (Authority and FRA 2012d). During summer, the Tule River is often characterized by alternating dry and wet periods, which result when irrigation districts take water from and discharge water to the natural channels. The Friant-Kern Canal also provides flow to the Tule River during summer. Tule River water that reaches the Tulare Lake bed is either stored for irrigation or evaporates (ICF Jones & Stokes 2008). The BNSF Alternative, the Corcoran Elevated Alternative, and the Corcoran Bypass Alternative would cross the Tule River south of Corcoran.

Deer Creek

Deer Creek originates in the southern Sierra watershed and flows west from the foothills of the Sierra Nevada in Tulare County. The creek is joined by Fountain Springs Gulch near Terra Bella. Stream flow data for Deer Creek were collected at a USGS gauging station in the Sierra Nevada foothills; the data are summarized in the *Fresno to Bakersfield Section: Hydrology and Water Quality Technical Report* (Authority and FRA 2012d). Deer Creek flows through the Pixley National Wildlife Refuge (Pixley NWR) on the valley floor and is crossed by the BNSF Alternative and the Allensworth Bypass Alternative. Deer Creek is channelized where it flows through the Pixley NWR and discharges to Homeland Canal approximately 2 miles west of the BNSF Alternative.

Poso Creek

Poso Creek originates in the southern Sierra watershed and flows west from the Sierra Nevada approximately 10 miles north of Bakersfield. Poso Creek receives discharge from the Cawelo Water District's Reservoir B for the purpose of intentional recharge (CVRWQCB 2007b). Poso Creek flows toward the Kern National Wildlife Refuge (Kern NWR), which is approximately 15 miles downstream of the study area (CVRWQCB 2007a). The BNSF Alternative and the Allensworth Bypass Alternative would cross Poso Creek north of Wasco.

Kern River

The Kern River, its forks, and Lake Isabella are the major water features within the Kern River Watershed (ICF Jones & Stokes 2008). The Kern River flows generally southwest through Bakersfield to the Buena Vista Lake bed. The upper reaches of the north and south forks of the Kern River are designated "wild and scenic." These reaches of the river are about 60 miles east of the project alternative alignments. In the valley, the Kern River is bordered by conveyance and diversion canals for much of its length, and its water is diverted for consumption or groundwater recharge (ICF Jones & Stokes 2008).

Isabella Dam, which was constructed in 1953 and is on the Kern River approximately 35 miles northeast of Bakersfield, forms Lake Isabella. The primary purpose of the dam and reservoir is to provide flood control. The dam is operated so that the maximum flow in the Kern River at the Pioneer turnout near Bakersfield does not exceed the capacity of the river channel, which is 4,600 cfs. Lake Isabella has a capacity of approximately 570,000 acre-feet, and provides water for irrigation (Gronberg et al. 1998). Stream flow data for the Kern River downstream of Lake Isabella were collected at USGS gauging stations; the data are summarized in the *Fresno to Bakersfield Section: Hydrology and Water Quality Technical Report* (Authority and FRA 2012d).

The Friant-Kern Canal joins the Kern River in the city of Bakersfield. The BNSF Alternative and the Bakersfield South Alternative cross the Kern River and the Friant-Kern Canal and various

other diversion canals, including the Arvin Edison Canal, Cross Valley Canal, Carrier Canal, Stine Canal, Kern Island Canal, and East Side Canal.

Vernal Pools and Swales

Vernal pools and swales occur in scattered locations throughout the study area, but are concentrated in the area between the towns of Corcoran and Wasco. They form as a result of the saline-sodic soils present in the study area. Vernal pools are shallow depressions with claypan or hardpan bottoms (fine-grain silts or clays) that retain water during the rainy season. These ponded pools support a community of hydrophytic plants endemic to vernal pools. Vernal swales are linear shallow depressions that receive hydrologic input from vernal pools. A network of pools and swales forms a vernal complex; such complexes are found in abundance in the vicinity of Allensworth.

Vernal pools and swales located immediately adjacent to the BNSF Railway tracks were probably man-made, are likely affected by routine maintenance of the right-of-way, and are hydrologically altered. For these reasons, these features are generally in fair ecological condition. The remaining vernal aquatic resources provide a number of aquatic and biological functions and services. In general, these features are in good ecological condition because they are in natural landscapes away from developed land uses; function within a natural hydrological regime (though some features are affected by a number of hydrological barriers [e.g., BNSF Railway right-of-way, SR 43]); provide considerable biological resources to plants and wildlife; and have an unaltered, natural physical structure.

4.2.2.3 Special Areas and Conservation Lands

A number of special areas important for biological resources are present in and in the vicinity of the Fresno to Bakersfield alternatives. Some of these areas are identified as part of existing species-specific resource plans, and others are existing public lands. Figure 4-8 depicts the location of these areas in relation to the HST alternatives. A summary of each area is provided below.

Critical Habitat

The federal Endangered Species Act defines critical habitat as designated areas that provide federally listed species with suitable habitat that includes the geographical locations and physical features essential to the conservation of a particular species. The federal ESA defines conservation as "all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter [the federal ESA] are no longer necessary" (16 United States Code Section 1532[3]).

Although the Fresno to Bakersfield Section does not overlap any designated or proposed critical habitat units, designated critical habitat for the vernal pool fairy shrimp (*Branchinecta lynchi*) is present in the vicinity of the city of Allensworth, where the BNSF Alternative is within 250 feet of Critical Habitat Unit 27B and Critical Habitat Unit 27C for the vernal pool fairy shrimp. However, the Fresno to Bakersfield Section is separated physically and hydraulically from Critical Habitat Unit 27C by the presence of SR 43 and the BNSF Railway right-of-way and is primarily separated from Critical Habitat Unit 27B by this existing infrastructure.

Where Critical Habitat Unit 27B crosses SR 43 and the BNSF right-of-way, it is composed of ruderal and annual grassland habitat that does not contain the Primary Constituent Elements for this species (i.e., vernal pools, swales, and other ephemeral wetlands and depressions). No direct or indirect impacts on vernal pool fairy shrimp critical habitat are anticipated as a result of the project.

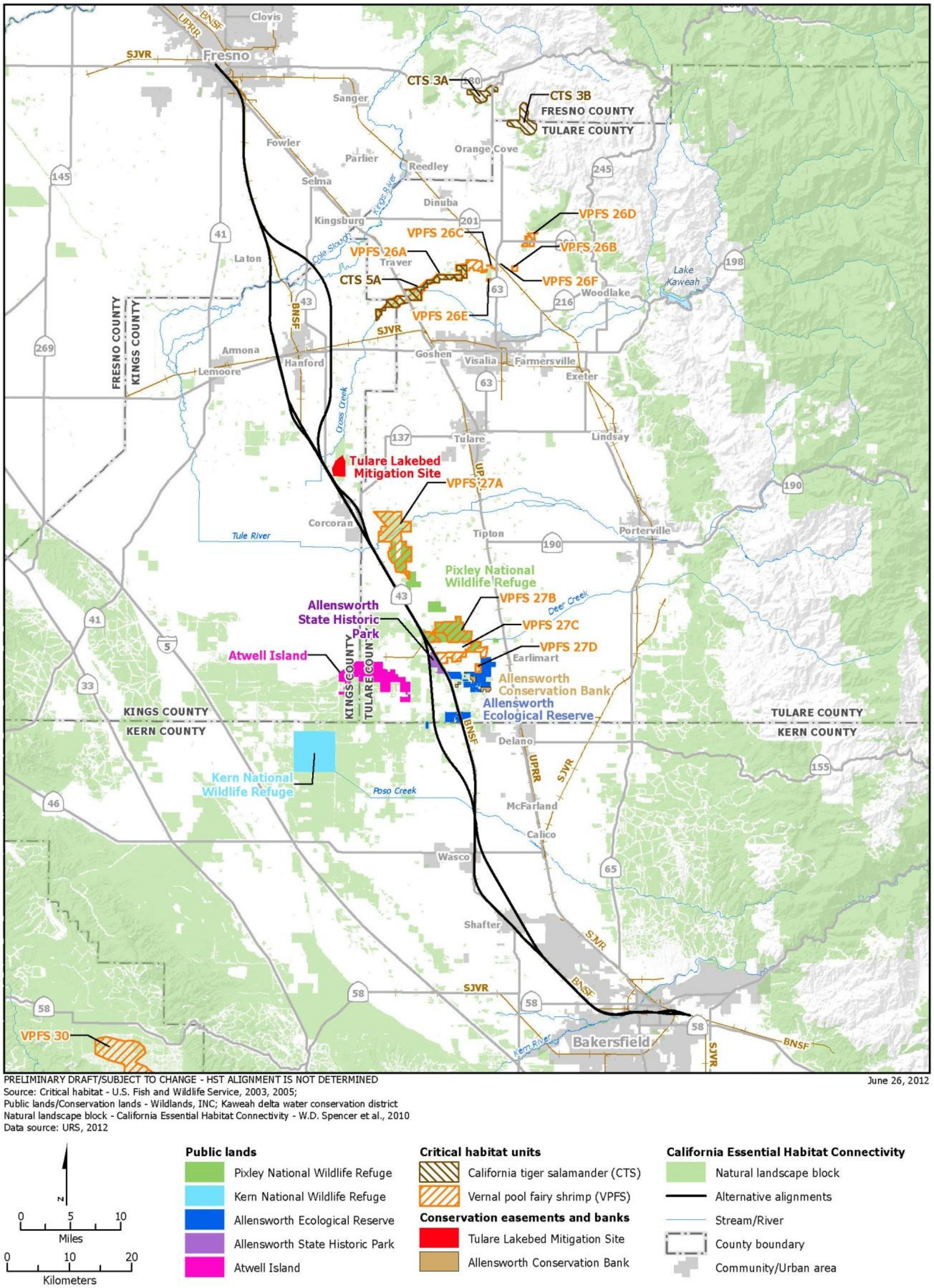

Figure 4-8
Special areas and conservation lands

Public Lands

Allensworth Ecological Reserve

The California Department of Fish and Game (CDFG) manages the Allensworth Ecological Reserve (Allensworth ER), which consists of a number of fragmented parcels in southern Tulare County and northern Kern County (Figure 4-8). The approximate 5,056 acres in the Allensworth ER contain a number of biological resources, including special-status plant communities, wetlands, and special-status plant and wildlife species. The reserve is open to the public for wildlife viewing (CDFG 2010). A portion of the Allensworth ER immediately west of the SR 43 and the BNSF Railway right-of-way is in the footprint of the BNSF Alternative. The Allensworth Bypass Alternative was designed to avoid impacts to Allensworth ER and the Colonel Allensworth State Historic Park.

Pixley National Wildlife Refuge

The Pixley NWR is in Tulare County, just south of the Tule River (Figure 4-8). The 6,389-acre refuge represents one of the few remaining examples of the grasslands, vernal pools, and playas that once bordered historical Tulare Lake. Over 100 bird and 6 reptile species use the refuge. Approximately 300 acres of managed wetlands provide habitat for migratory waterfowl and shorebirds. The primary management focus of the U.S. Fish and Wildlife Service (USFWS) for the refuge is to maintain and restore native habitats, including wetlands and upland habitat (USFWS 2009). The Pixley NWR is near the HST alternatives (i.e., the BNSF Alternative and the Allensworth Bypass Alternative [1,000 feet west of the Pixley NWR]), but the HST alternatives do not overlap the NWR. The construction of the HST alternatives would not result in direct impacts. Because of the considerable distance and the existing SR 43 and BNSF Railway barriers, no indirect impacts are expected to occur to the Pixley NWR.

Kern National Wildlife Refuge

The Kern NWR is in Tulare County, west of Delano at the southern end of the San Joaquin Valley (Figure 4-8). The 11,249-acre refuge contains seasonal wetlands, a riparian corridor, valley grasslands, alkali playa, and valley sink scrub habitats. Approximately 6,500 acres of managed wetlands provide habitat for wintering and migrating waterfowl and shorebirds. Upland areas (3,600 acres) are reserved as habitat for federally listed species such as the Tipton kangaroo rat, blunt-nosed leopard lizard, and San Joaquin kit fox. The primary management focus of the USFWS for the refuge is to maintain and restore native habitats, including wetlands and historical valley upland habitat (USFWS 2011a). The Kern NWR is 9.8 miles west of the HST alternatives (i.e., the Allensworth Bypass Alternative). The HST alternatives do not overlap the NWR, and the construction of the HST alternatives would not result in direct or indirect impacts on this public land.

Colonel Allensworth State Historic Park

The Colonel Allensworth State Historic Park is in Tulare County, near the town of Allensworth (Figure 4-8), which was the only California town to be founded, financed, and governed by African Americans. The 240-acre historical park contains several homes, a bakery, a blacksmith area, a drugstore, a barber shop, a post office, a library, a hotel, a schoolhouse, a Baptist church, a restaurant, various farm buildings, and several other buildings, which were reconstructed to reflect the 1908 to 1918 historical period (California State Parks 2009). The primary management focus is the preservation, development, and interpretation of resources of the historical community of Allensworth. The BNSF Alternative is on the far eastern boundary of the Colonel Allensworth State Historic Park. The Allensworth Bypass Alternative would occur approximately 0.5 mile west of the Colonel Allensworth State Historic Park was designed to avoid impacts to this important historical resource.

Atwell Island

The Atwell Island Land Retirement Demonstration Project (Atwell Island) lies between the Pixley NWR and the Kern NWR (Figure 4-8). This 7,000-acre area is in Kings and Tulare counties, south of the town of Alpaugh in the southeastern portion of what was once Tulare Lake. Atwell Island contains a number of biological resources, including special-status plant communities, wetlands, and special-status wildlife species. It is an agglomeration of land, water, and other property interests purchased from willing sellers by a federal interagency team. This area is currently managed by the Bureau of Land Management with the primary management goal of restoring native valley grasslands, wetlands, and alkali sink habitats on what was once marginal agricultural land. The project provides habitat corridor connections with the surrounding protected lands of the Pixley NWR, Kern NWR, Allensworth ER, and Sand Ridge (BLM 2011; USDI 2010). Atwell Island is west of SR 43 and is 2 miles west of the Allensworth Bypass Alternative; therefore, the HST alternatives do not overlap this area. Because of the considerable distance to any of the HST alternatives, no direct or indirect impacts are expected to occur to Atwell Island.

Conservation Easements and Banks

Tulare Lake Bed Mitigation Site

The Tulare Lake Bed Mitigation Site (Corcoran Reservoir), a conservation easement in the vicinity of Cross Creek, is near the study area (Figure 4-8). The Tulare Lake Bed Mitigation Site was placed into a conservation easement as mitigation for the Lake Kaweah Enlargement Project, and the mitigation site provides habitat for shorebirds and other migrating water fowl. The site was developed and is maintained by the Kaweah Delta Water Conservation District. The conservation area is approximately 1,300 acres. The Fresno to Bakersfield HST alignment alternatives were designed to avoid the Tulare Lake Bed Mitigation Site.

Allensworth Conservation Bank

Conservation banks are large blocks of land that are preserved, restored, and enhanced for the purpose of providing mitigation for projects that take special-status species, wetlands, or other vegetated biological communities. One conservation bank, the Allensworth Conservation Bank, is in the project vicinity; however, this bank is outside the study area (Figure 4-8).

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Section 5.0
Results: Watershed Profile

5.0 Results: Level 1 Watershed Profile

This section presents and describes the watersheds and aquatic resources present in the areas for the Fresno to Bakersfield Section alternatives for the HST System. The description includes the types, extent, and condition of the aquatic resources present based on the methods described in Section 3.1, Methodology: Watershed Evaluation. This section relies heavily on figures, tables, and charts created to represent a large of amount of data gathered and synthesized. The profile for each watershed is presented within the context of broad, landscape-level ecoregions (i.e., the Coast Ranges, Great Valley, Sierra Nevada Foothills, Sierra Nevada, and Mountains and Valleys).

As a quick summary of methods, the watershed profile uses land use data to characterize the condition of aquatic resources by relating aquatic resource condition to land use types. Aquatic resources within a land use that likely lead to the degradation of aquatic resources (e.g., high-intensity agriculture, developed areas) are considered in poor condition. Similarly, aquatic resources in land use types that may lead to a moderate amount of degradation (e.g., low-intensity agriculture) are in fair condition; aquatic resources in resource types being maintained with little to no degradation (e.g., natural land, open space) are in good condition.

5.1 Watersheds and Ecological Sections

The Fresno to Bakersfield Section occurs within seven HUC-8 watersheds in the Tulare Lake Basin. Significant natural drainage features that intersect with the Fresno to Bakersfield alternative alignments include Kings River, Cross Creek, Tule River, Deer Creek, Poso Creek, and Kern River (Figure 4-3). The names of the HUC-8 watersheds, the major surface water features, and the area (in acres) of each watershed are summarized in Table 5-1. Figure 4-2 shows the Fresno to Bakersfield Section alternatives in the context of the seven watersheds applicable to the proposed project.

Table 5-1
Watersheds in the Fresno to Bakersfield Section

Sub-Basin (HUC-8 Number)	Major Water Features	Watershed Area (acres)	Associated Ecological Sections (acreage)
Upper Dry Watershed (18030009)	Kings River	1,360,736	Central California Coast Ranges (118109ac) Great Valley (1173611ac) Sierra Nevada (3709ac) Sierra Nevada Foothills (65307ac)
Tulare–Buena Vista Lakes Watershed (18030012)	Kings River, Cross Creek, Tule River	2,425,479	Central California Coast Ranges (757215ac) Great Valley (1549906ac) Sierra Nevada (11260ac) Sierra Nevada Foothills (107098ac)

Table 5-1
Watersheds in the Fresno to Bakersfield Section

Sub-Basin (HUC-8 Number)	Major Water Features	Watershed Area (acres)	Associated Ecological Sections (acreage)
Upper Kaweah Watershed (18030007)	Cross Creek	974,463	Great Valley (445951ac) Sierra Nevada (277061ac) Sierra Nevada Foothills (251451ac)
Upper Tule Watershed (18030006)	Tule River	604,989	Great Valley (285401ac) Sierra Nevada (131849ac) Sierra Nevada Foothills (187738ac)
Upper Deer-Upper White Watershed (18030005)	Deer Creek, Friant-Kern Canal	783,532	Great Valley (569641ac) Sierra Nevada (26258ac) Sierra Nevada Foothills (187632ac)
Upper Poso Watershed (1803004)	Poso Creek, Friant Kern Canal	368,615	Great Valley (223262ac) Sierra Nevada (39811ac) Sierra Nevada Foothills (105541ac)
Middle Kern–Upper Tehachapi–Grapevine Watershed (1803003)	Kern River	1,676,358	Central California Coast Ranges (51311ac) Great Valley (830807ac) Sierra Nevada (383228ac) Sierra Nevada Foothills (370762ac) Southern California Mountain and Valley (40250ac)
Total	**--**	**10,509,597**	
HUC-8 = Hydrologic Unit Code 8			

Significant land use changes have occurred in the Great Valley, where over 70% of habitats have been converted to agricultural or urban uses (i.e., high-intensity uses). Although each watershed in the Tulare Lake Basin has its unique hydrological features and habitats, the trends in land conversion and land use are generally consistent across the ecological sections. Most of the historical impacts to the watershed have occurred within the valley, where rivers have been diverted and run into highly controlled canals. In general, land use conversion to high- or low-intensity uses in the Sierra Nevada and its foothills has been limited. In the foothills, changes in land use and impacts to aquatic resources exist, but are much more limited—rivers remain largely contiguous, though dams and reservoirs are prominent additions to the landscape. The higher-elevation headwaters in the Sierra Nevada largely remain unmodified. Chart 5-1 reports natural, low-intensity, and high-intensity land uses in each watershed by ecological section.

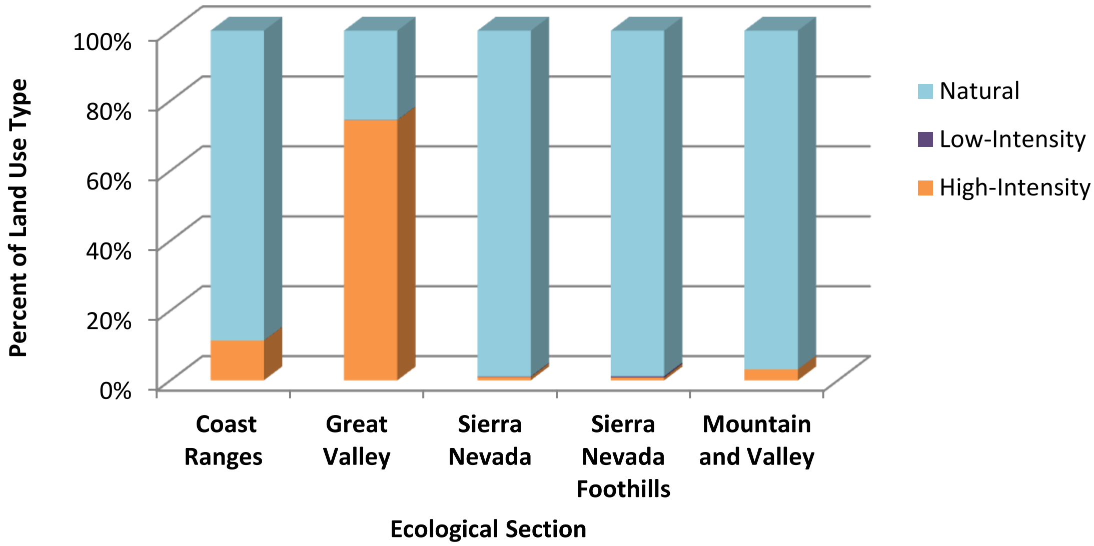

Chart 5-1. Land use types in the Tulare Lake Basin watersheds that intersect the Fresno to Bakersfield Section alternatives, grouped by ecological section.

At the project level, all of the streams and rivers within the Fresno to Bakersfield Section alternative alignments have been dredged, culverted, diverted, dewatered, channelized, or have had their active floodplains severely reduced by levee construction. Therefore, most of the surface water in the project footprint is found in irrigation canals, ditches, or water retention/detention basins; however, surface water is also occasionally found in river channels or precipitation-fed wetlands and vernal pools. The remaining wetlands are largely unrelated to the historical floodplains or regional aquifers.

5.2 Level 1 Watershed Profile

This section describes the profile of each watershed present in the Fresno to Bakersfield Section alternative alignments from north to south. For the watershed profiles, the acreages for vernal pools are based on the Holland Central Valley Vernal Pool Complexes data layer, which identifies vernal pool landscapes (not vernal pool areas). These data layers artificially inflate the amount of vernal pool resources, because they contain both upland and aquatic habitats. Nonetheless, given the sensitivity of vernal pools, the upland communities offer important overall contributions to the vernal pools and their overall health.

5.2.1 Upper Dry Watershed

The Upper Dry Watershed occurs in the northwest portion of the Tulare Lake Basin, south of the San Joaquin River (Figures 5-1a and 5-1b). Major water features within this watershed include the Friant-Kern Canal and the North Fork of the Kings River. The latter is the only potential hydrologic outlet for entire Tulare Lake Basin; in high water years, flood releases from the Pine Flat Dam are directed to the north fork, to the San Joaquin River, and eventually to San Francisco Bay (KRCD and KRWA 2009). The Pine Flat Dam demarcates the upper and lower regions of the Kings River (EPA 2007). The water provided by the greater Kings River system contributes to one of the most productive agricultural regions in the United States and continues to be one of the most fertile farming regions in the world (KRCD and KRWA 2009).

The Fresno to Bakersfield Section spans about 118 miles. Approximately 23 miles of the alignment lies within the Upper Dry Watershed. The part of the alignment within this watershed

begins in urban Fresno and heads south through the Great Valley Ecological Section. This part of the watershed has been highly modified, developed, and farmed. Land use around the projected alignment consists mostly of urban areas, vineyards, cropland, and orchards (Figure 5-1a).

Within the Great Valley Section of the Upper Dry Watershed, most of the waterways have been converted to canals and ditches (Figure 5-1b). Chart 5-2 shows the distribution of aquatic features (in millions of linear feet and thousands of acres) by condition (good, fair, and poor) by Tulare Lake Basin ecological section. In the valley, high-intensity land uses are prominent and likely result in the mostly poor ecological condition of the various linear aquatic features. In the coast and foothill sections, the situation is reversed; most of the linear aquatic features are considered good because they fall within natural land uses.

Most of the remaining vernal pools and emergent wetlands in the Great Valley section are within natural land contexts, though they are mostly far to the west and east of the alternative alignments (just south of the San Joaquin River and along the base of the Sierra Nevada Foothills). Other water features are mostly within the urban or agricultural matrix (Table 5-2). In the Sierra Nevada Foothills, about half of the vernal pools are within high-intensity land uses, but most other water features, except for the forested/shrub wetland and lake features, are within natural land uses. In the Sierra Nevada, all of the aquatic features are within natural land uses.

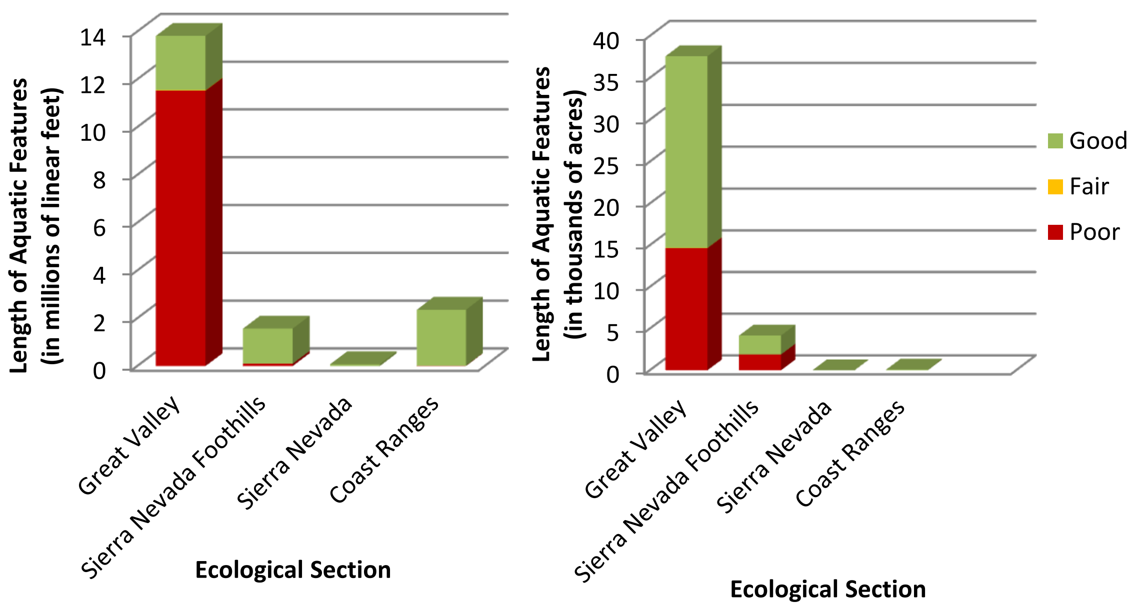

Chart 5-2
Length of aquatic features by condition (in linear feet and acres) within the Upper Dry Watershed, grouped by ecological section.

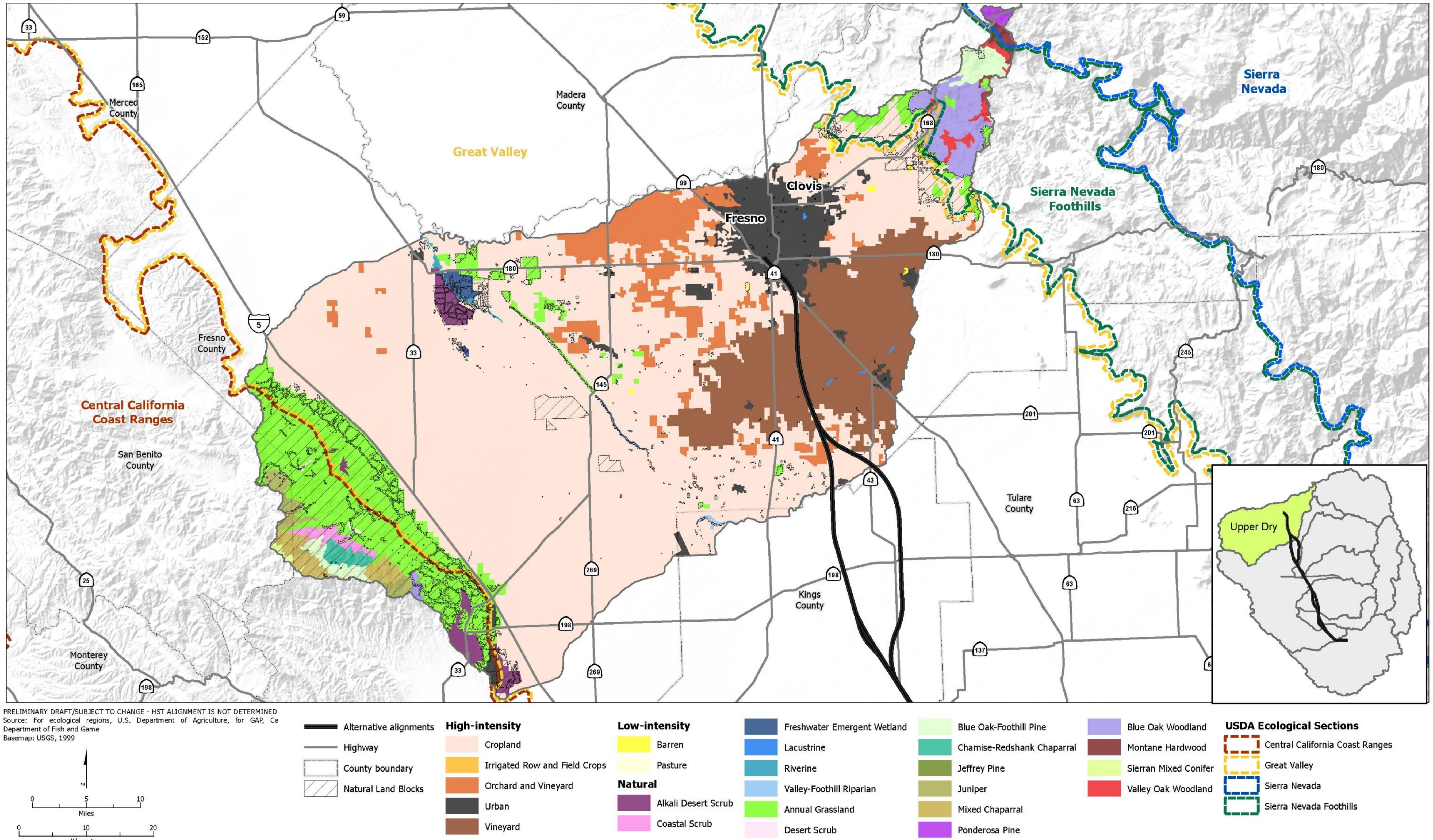

Figure 5-1a
Land use in the Upper Dry Watershed

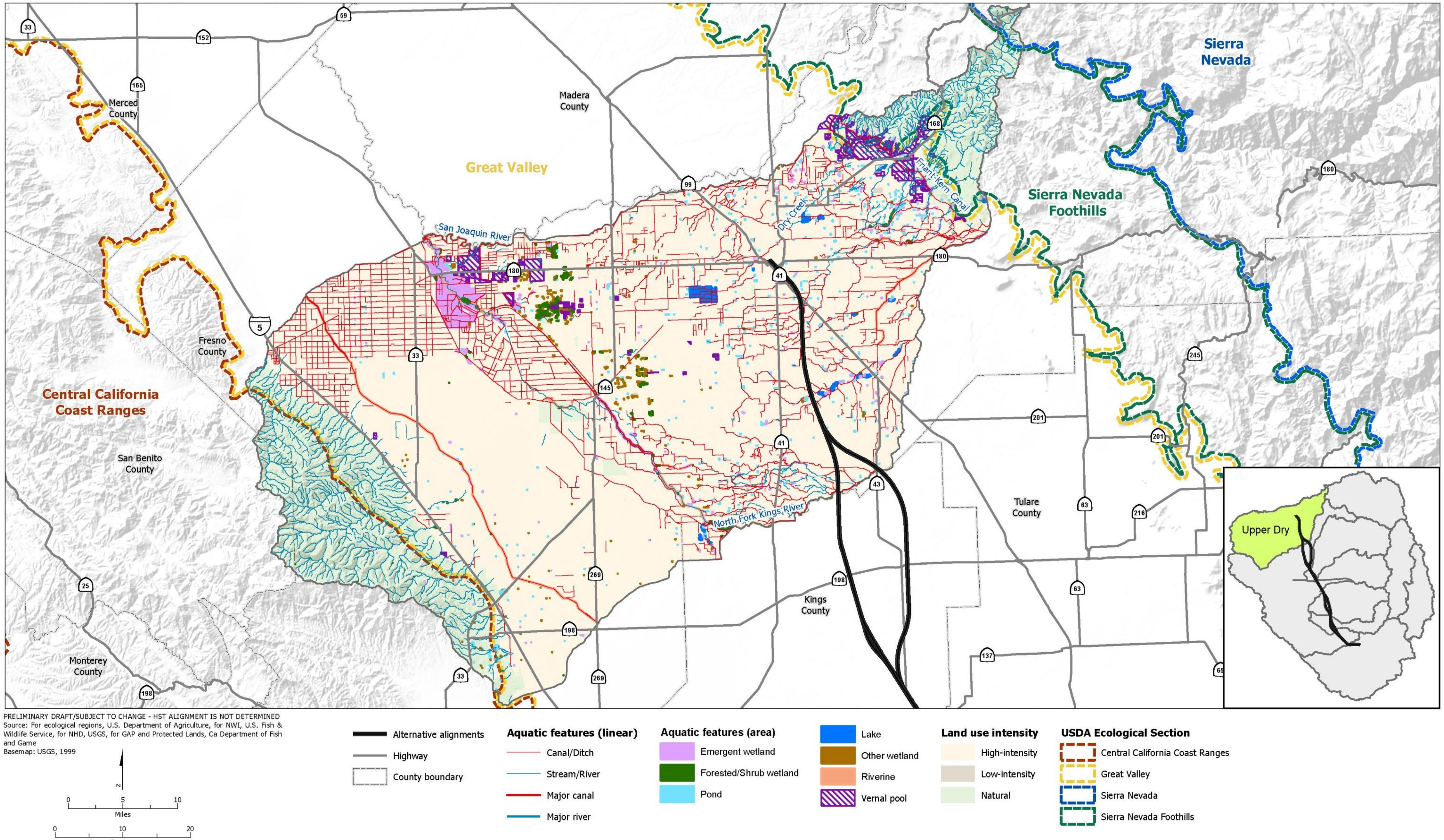

Figure 5-1b
Aquatic features in the Upper Dry Watershed

Table 5-2
Condition of Aquatic Features in the Great Valley Section of the Upper Dry Watershed

Water Feature (Area Measure)	Poor		Fair		Good		Total
	Acres/ Linear Feet	Percentage	Acres/ Linear Feet	Percentage	Acres/ Linear Feet	Percentage	
Canal/Ditch (LF)	10,218,791.3	93%	10,555.5	<1%	725,772.8	7%	10,955,119.7
Stream/River (LF)	1,304,141.7	46%	9,553.3	<1%	1,547,874.6	54%	2,861,569.6
Emergent Wetland (Ac)	1,421.7	13%	0.4	<1%	9,599.1	87%	11,021.2
Forested/Shrub Wetland (Ac)	956.3	54%	—	—	822.4	46%	1,778.7
Lake (Ac)	2,567.8	89%	—	—	312.8	11%	2,880.6
Other Wetlands (Ac)	484.3	60%	7.9	1%	319.0	39%	811.2
Pond (Ac)	1,311.6	84%	1.8	<1%	239.1	15%	1,552.5
Riverine (Ac)	1,404.2	55%	10.6	<1%	1,150.6	45%	2,565.5
Vernal Pool (Ac)	6,504.5	38%	8.2	<1%	10,453.6	62%	16,966.4

LF = linear feet
Ac = acres

5.2.2 Tulare–Buena Vista Lakes Watershed

The Tulare–Buena Vista Lakes Watershed includes the lower reaches of Kings River below the Pine Flat Dam. Major tributaries within the watershed include Mill Creek and Hughes Creek. The Kings River splits into multiple channels in the Centerville Bottoms and continues to run generally east to west across the valley floor. The Kings River used to terminate at Tulare Lake, and most of the historical Tulare Lake bed occurs within the Tulare–Buena Vista Lakes Watershed. Since 1898, most of the water in the Kings River has been diverted for agricultural and municipal use before it reaches the Tulare Lake (KRCD 2003). Figures 5-2a and 5-2b are generated from the National Wetlands Inventory dataset, which still classifies the Tulare Lake as an extant lake even though it is currently farmed and is rarely inundated.

This watershed intersects the Fresno to Bakersfield alternatives at three points: first, within the northern half, near Hanford; second, in roughly the midpoint of the section, near Corcoran; and third, from Wasco to the outskirts of Bakersfield. Over 40 miles of the 118-mile Fresno to Bakersfield section is within the Tulare–Buena Vista Lakes Watershed. In all of these areas within the watershed, the alternative alignments lie along the valley floor in areas of high-intensity land use (Figure 5-2a). Land use is primarily croplands, with an alignment intersecting urban Shafter and some orchards in the southernmost region of this watershed. Only the northernmost section of the alternative alignments crosses a continuous water body, the Kings River, within the watershed.

Many of the aquatic features in the Great Valley Section of the Tulare–Buena Vista Lakes Watershed are in high-intensity land uses that likely result in the poor ecological condition of the aquatic features. Canals and ditches are mostly found within agricultural lands. Riverine features, lakes, and freshwater ponds are mostly in urban or agricultural areas (Figure 5-2b). Chart 5-3 shows that most of the aquatic features in the Great Valley are within high-intensity landscapes. Linear features in the Coastal Ranges (i.e., streams and rivers) are primarily in natural land contexts.

Table 5-3 shows that within the Great Valley, canals, ditches, ponds, and lakes are in areas of high-intensity land uses, and vernal pools, emergent wetlands, and streams/rivers are in more natural contexts. Some of the vernal pools are in protected open space—many occur within the Pixley NWR, which is east of the alternative alignments (see Figure 4-8).

Aquatic features in the Sierra Nevada and the Sierra Nevada Foothills are in largely (>97%) natural land uses. The Coast Ranges are relatively pristine, and the streams and rivers there are in good condition. The canals, ditches, and lakes in this ecological region are in poor condition, though the proportions of these features are much reduced in comparison with the Great Valley. The aquatic features in the Sierra Nevada and the Sierra Nevada Foothills are largely associated with low-intensity land use. These ecological regions are far removed from the potential effects of the HST System.

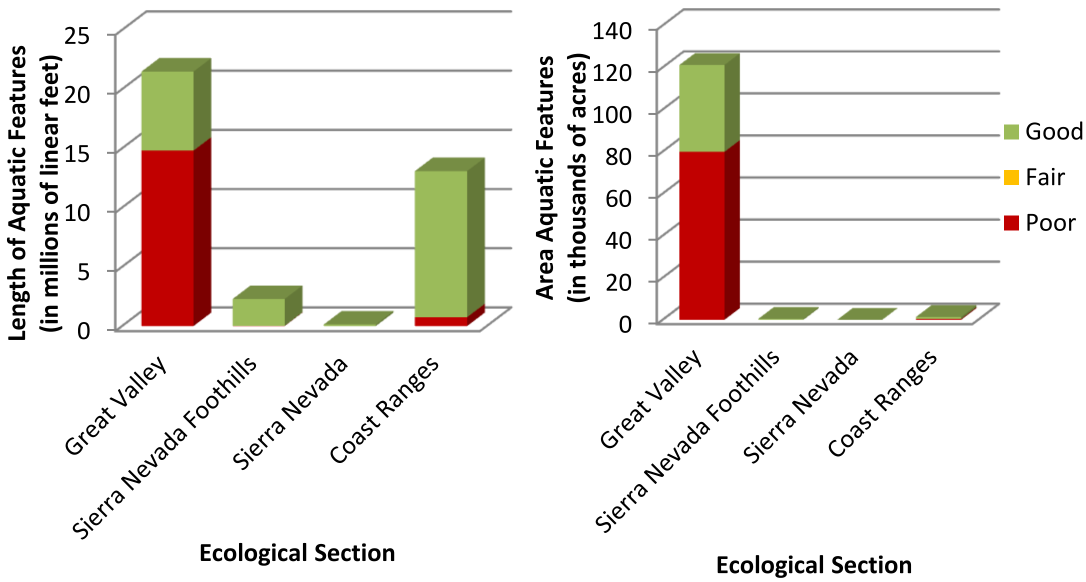

Chart 5-3

Area of aquatic features by conditions (in acres and linear feet) within the Tulare–Buena Vista Lakes Watershed, grouped by ecological section.

Table 5-3
Condition of Aquatic Features in the Great Valley Section of the Tulare–Buena Vista Lakes Watershed

Water Feature (Area Measure)	Poor		Fair		Good		Total
	Acres/Linear Feet	Percentage	Acres/Linear Feet	Percentage	Acres/Linear Feet	Percentage	
Canal/Ditch (LF)	12,898,130.2	86%	—	—	2,039,436.4	14%	14,937,566.6
Stream/River (LF)	1,918,882.7	29%	2,812.4	<1%	4,628,218.2	71%	6,549,913.3
Emergent Wetland (Ac)	2,089.4	15%	1.5	<1%	12,198.3	85%	14,289.3
Forested/Shrub Wetland (Ac)	1,427.3	65%	—	—	763.1	35%	2,190.4
Lake (Ac)	68,779.5	81%	—	—	16,147.0	19%	84,926.5
Other Wetlands (Ac)	640.5	39%	—	—	997.3	61%	1,637.8
Pond (Ac)	1,587.2	70%	0.8	<1%	691.1	30%	2,279.1
Riverine (Ac)	3,545.1	77%	—	—	1,050.3	23%	4,595.3
Vernal Pool (Ac)	1,847.2	16%	—	—	9,426.4	84%	11,273.5

LF = linear feet
Ac = acres

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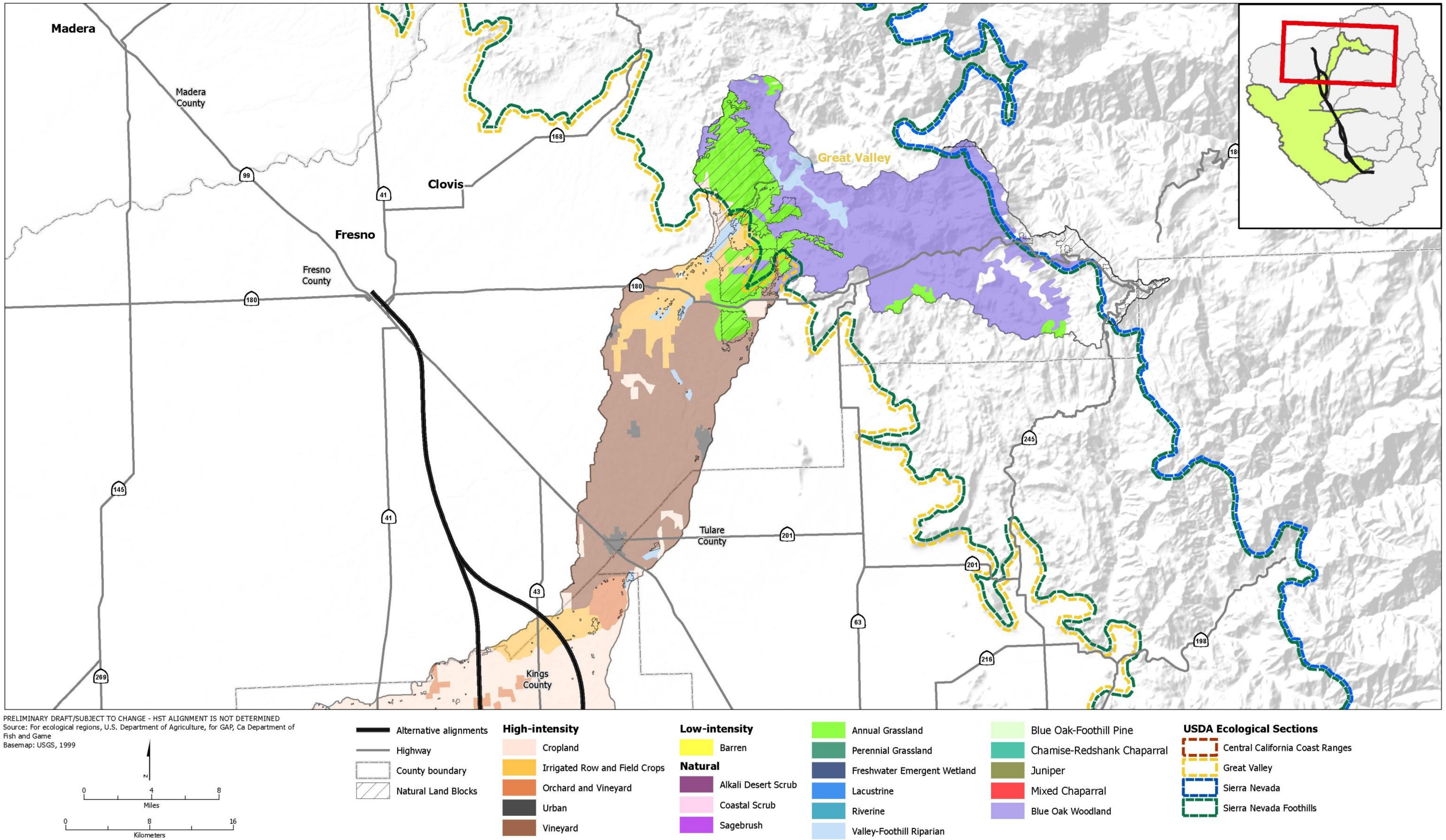

Figure 5-2a
Land use in the Tulare–Buena Vista Lakes Watershed (Sheet 1 of 3)

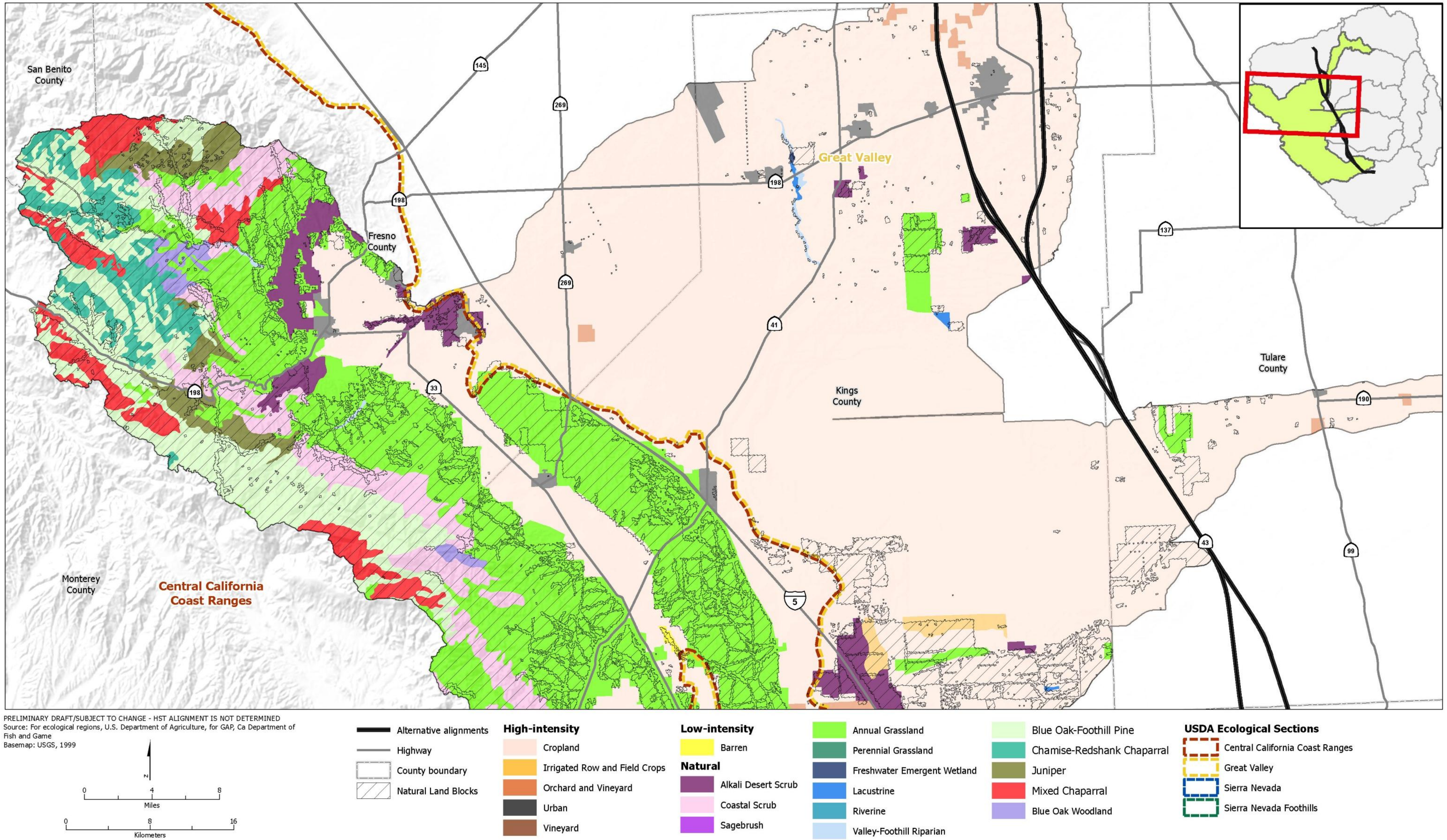

Figure 5-2a
Land use in the Tulare–Buena Vista Lakes Watershed (Sheet 2)

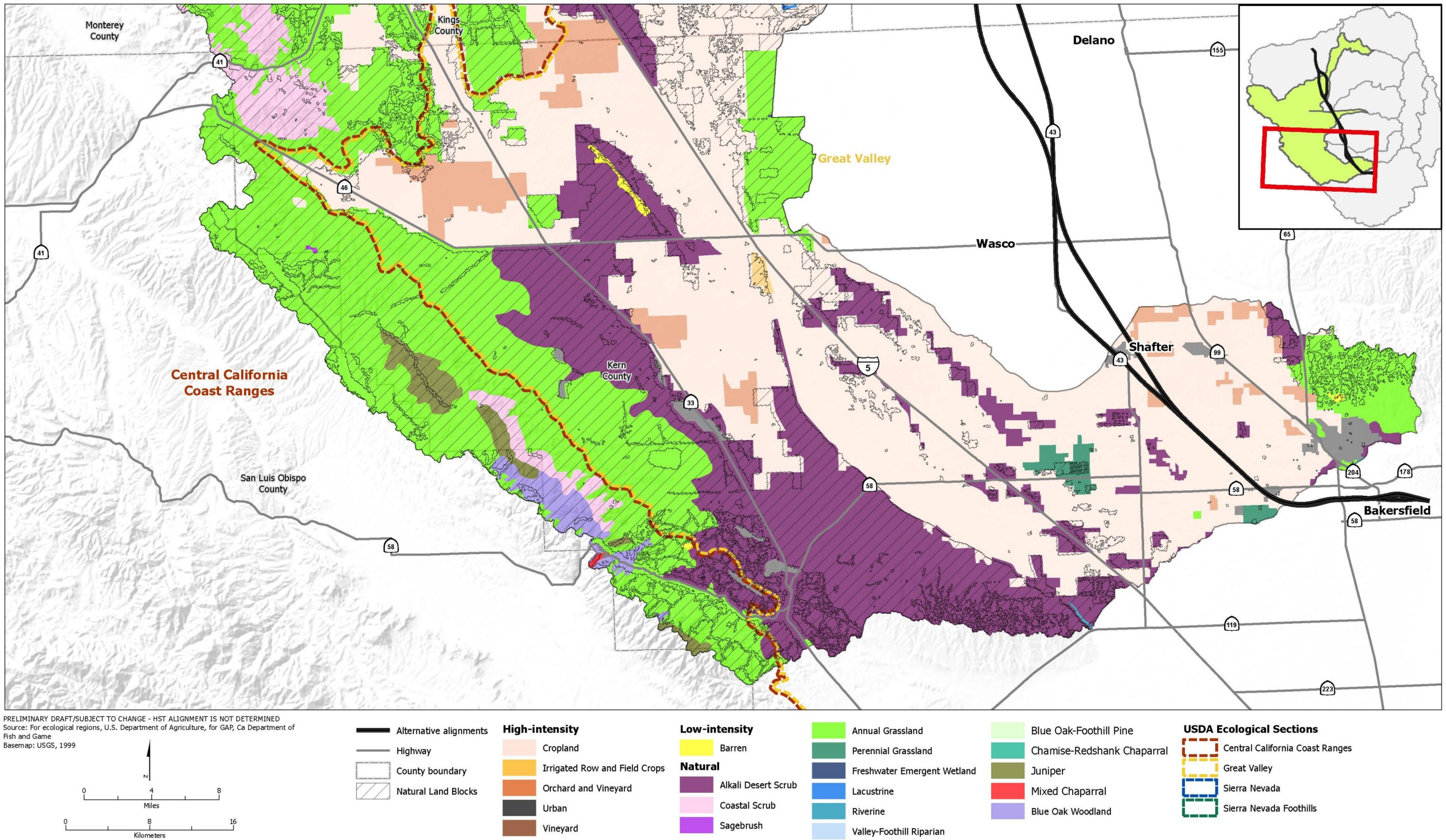

Figure 5-2a
Land use in the Tulare–Buena Vista Lakes Watershed (Sheet 3)

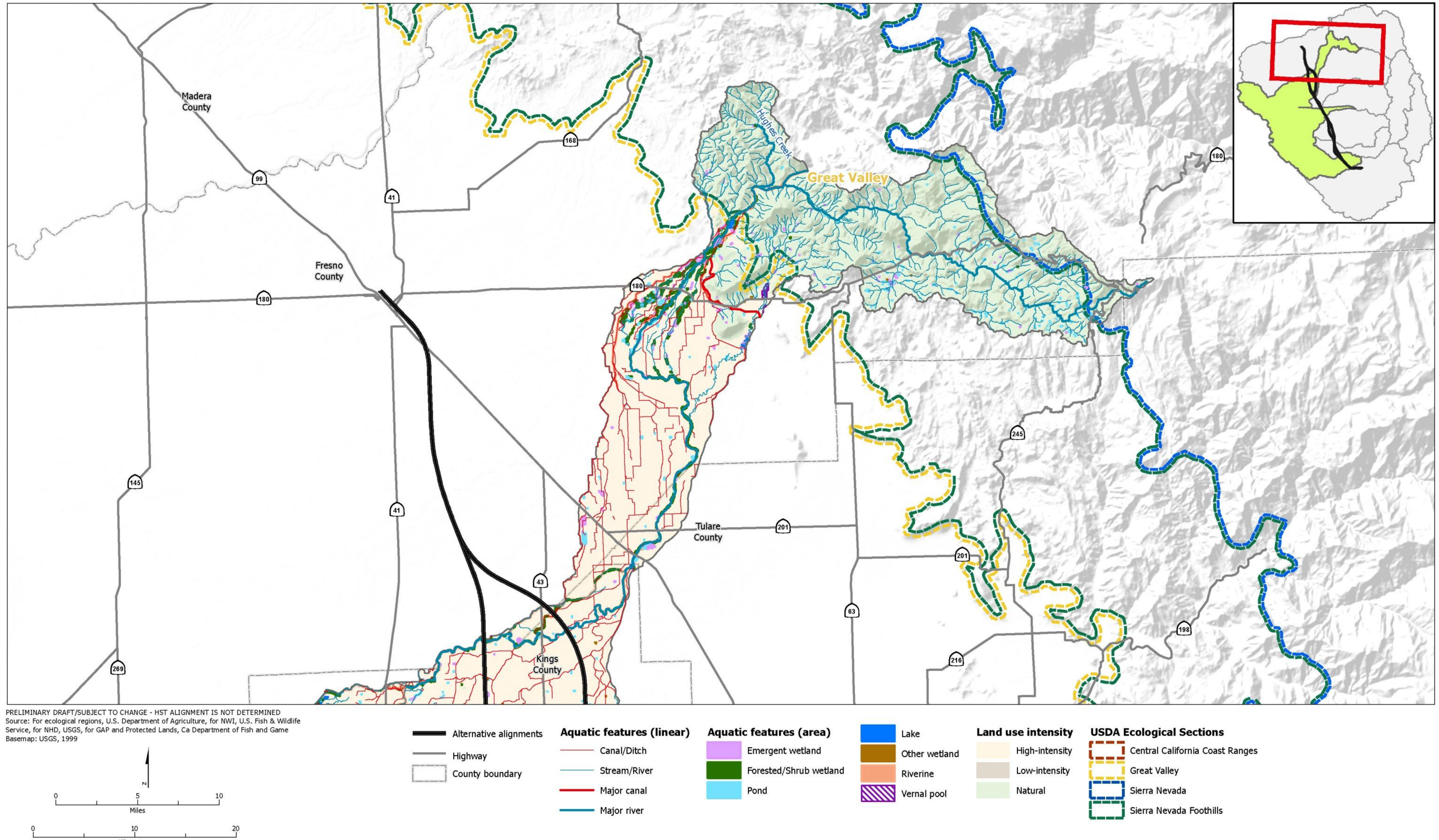

Figure 5-2b
Aquatic features in the Tulare–Buena Vista Lakes Watershed (Sheet 1 of 3)

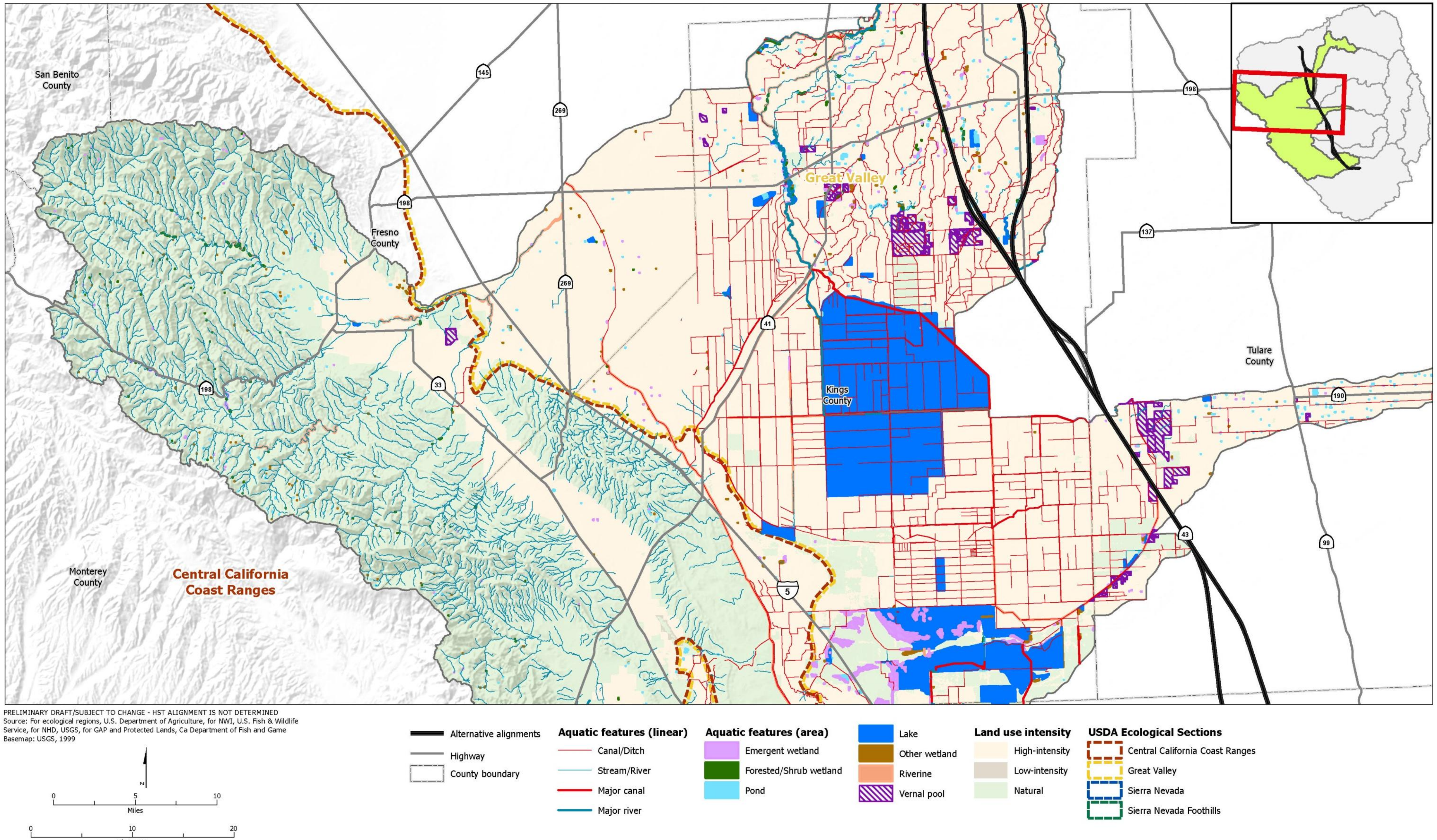

Figure 5-2b
Aquatic features in the Tulare–Buena Vista Lakes Watershed (Sheet 2)

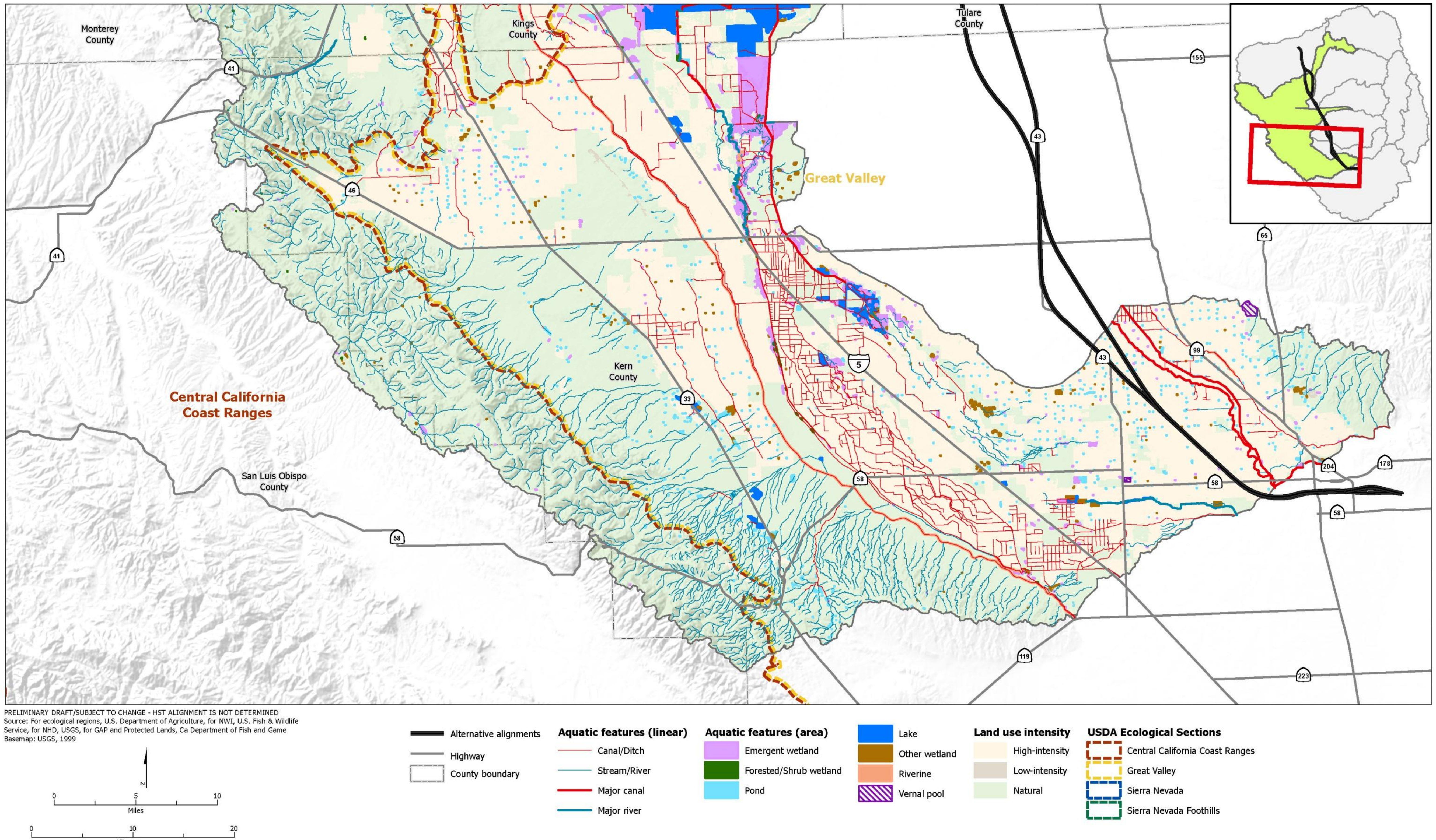

Figure 5-2b
Aquatic features in the Tulare–Buena Vista Lakes Watershed (Sheet 3)

CALIFORNIA High-Speed Rail Authority
U.S. Department of Transportation Federal Railroad Administration

5.2.3 Upper Kaweah Watershed

The Upper Kaweah Watershed includes the headwaters and main stems of the Kaweah River. Terminus Dam, built by 1962, splits the river into its upper and lower reaches. Water from the Kaweah begins to be diverted by a series of ditches just downstream of Terminus Dam. These diversion ditches continue to move water out of the Kaweah River and its tributaries throughout the watershed. At 3 miles downstream of the dam, the main river splits into the St. John's River and the Lower Kaweah River. The St. Johns River eventually becomes Cross Creek and terminates in the historical Tulare Lake bed (EPA 2007).

The Fresno to Bakersfield alternative alignments intersect with the southern tip of the Upper Kaweah Watershed along the valley floor. About 9.5 miles of the 118-mile Fresno to Bakersfield Section lay within this watershed. The land use in this area is primarily cropland and urban (Figure 5-3a). Aquatic features in this area include canals and ditches, though a vernal pool complex occurs adjacent to the HST alignment (Figure 5-3b).

Chart 5-4 shows most of the linear aquatic features within the Great Valley are in high-intensity land uses that likely result in poor ecological condition. Linear aquatic features in the Sierra Nevada and the Sierra Nevada Foothills remain in natural land contexts and host aquatic features likely in good ecological condition.

Table 5-4 shows that most (83%) of the vernal pools in the Great Valley are found in natural land uses, as are the emergent and forested wetlands. Many aquatic features in the Great Valley are found in high-intensity land uses, especially the canals and ditches that supply water to agricultural fields: 94% of these aquatic features are in poor ecological condition. The land use conditions in the Sierra Nevada and the Sierra Nevada Foothills are mostly natural and are considered to be in good condition.

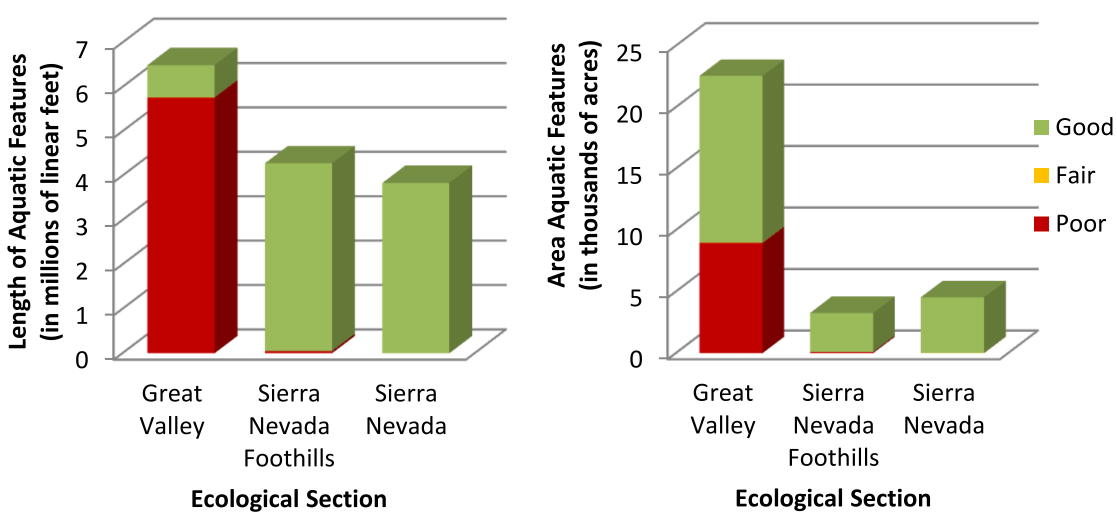

Chart 5-4
Area aquatic feature by conditions (in acres and linear feet) within the Upper Kaweah Watershed grouped by ecological section.

Table 5-4
Condition of Aquatic Features in the Great Valley Section of the Upper Kaweah Watershed

Water Feature (Area Measure)	Poor		Fair		Good		Total
	Acres/ Linear Feet	Percentage	Acres/ Linear Feet	Percentage	Acres/ Linear Feet	Percentage	
Canal/Ditch (LF)	4,447,834.1	94%	1,213.2	<1%	295,872.7	6%	4,744,920.0
Stream/River (LF)	1,314,006.5	75%	1,802.7	<1%	431,609.9	25%	1,747,419.1
Emergent Wetland (Ac)	337.7	36%	2.0	<1%	586.8	63%	926.5
Forested/Shrub Wetland (Ac)	53.8	23%	11.4	5%	170.7	72%	235.8
Lake (Ac)	4,315.8	82%	—	—	971.4	18%	5,287.2
Other Wetlands (Ac)	40.6	27%	—	—	107.7	73%	148.3
Pond (Ac)	815.2	83%	13.5	1%	153.1	16%	981.8
Riverine (Ac)	1,020.4	83%	6.2	1%	206.5	17%	1,233.1
Vernal Pool (Ac)	2,370.0	17%	—	—	11,366.5	83%	13,736.6

LF = linear feet
Ac = acres

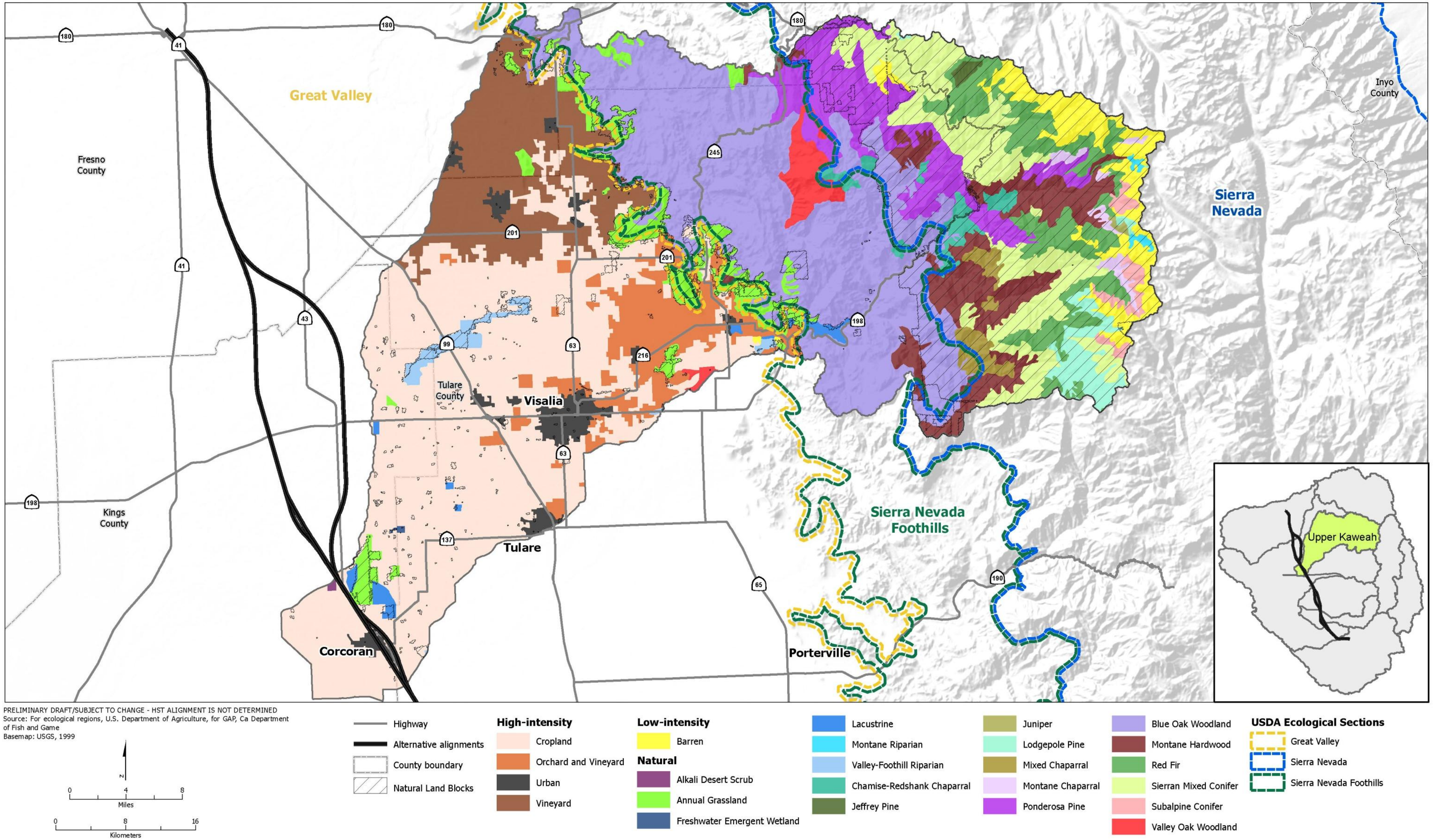

Figure 5-3a
Land use in the Upper Kaweah Watershed

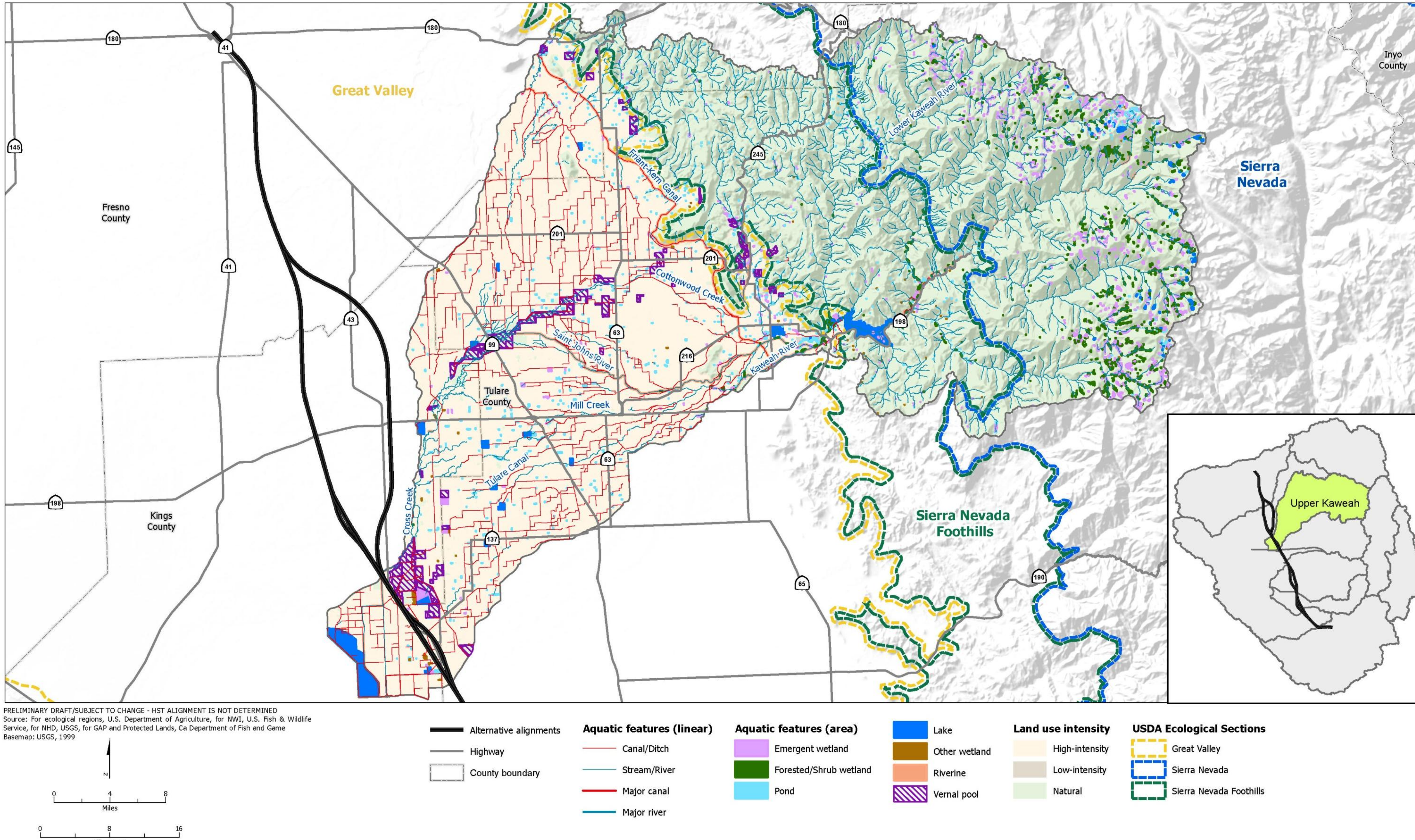

Figure 5-3b
Aquatic features in the Upper Kaweah Watershed

5.2.4 Upper Tule Watershed

The Upper Tule Watershed primarily consists of the Tule River and its tributaries and reaches. Success Dam retains waters from the upper regions of the Tule River, supplies irrigation water, and minimizes the risk of flooding downstream. Diversion ditches move flows from the river to canals just downstream of the dam. The Friant-Kern Canal inputs water into the Tule River in most years.

The Fresno to Bakersfield alternative alignments only intersect a tiny fragment of the Upper Tule Watershed, at the southern end of the watershed. Only about 1 mile of the 118-mile Fresno to Bakersfield Section occurs within the Upper Tule Watershed. Land use in this area is dominated by cropland (Figure 5-4a). The only aquatic feature that the alternative alignments intersect in this area is the terminus of Tule River as it enters the Tule Lake Basin (Figure 5-4b). This section of the river is generally dewatered, because water only reaches the Tule Lake Basin in extremely wet years.

Most of the linear aquatic features in the Great Valley section of the Upper Tule Watershed are within high-intensity land uses (Chart 5-5). Wetland acreages within the Great Valley are in mostly natural land uses (Chart 5-5). These features are far removed from the effects of the HST alternative alignments because most lie well to the east of the 1-mile segment of HST alignment in this watershed.

The canal/ditches, ponds, and riverine features are mostly within high-intensity land uses in the Great Valley (Table 5-5). In the Sierra Nevada and the Sierra Nevada Foothills ecological sections, nearly all aquatic features are within either low-intensity or natural land uses.

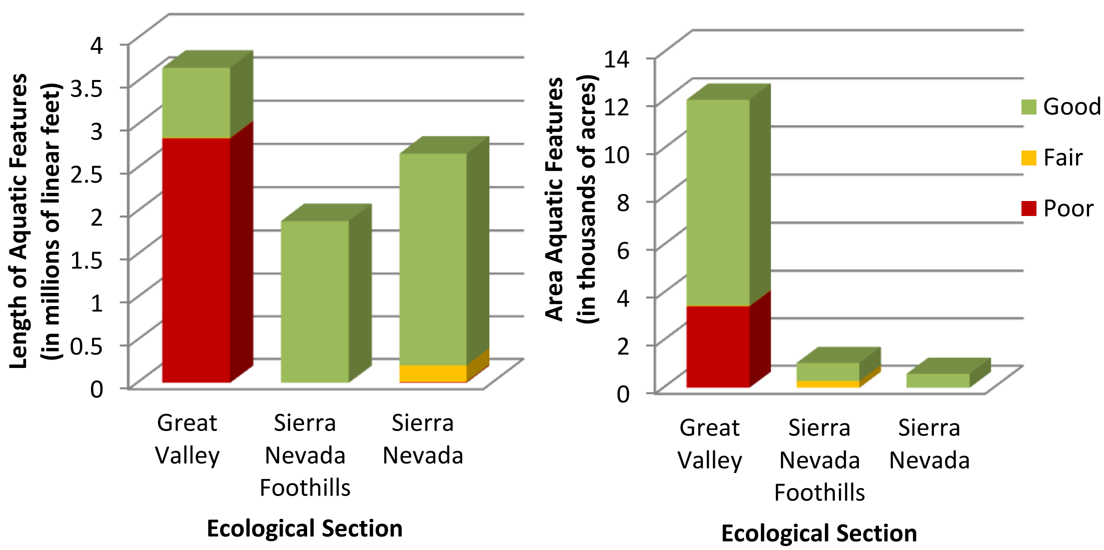

Chart 5-5
Area of aquatic features by conditions (in acres and linear feet) within the Upper Tule Watershed grouped by ecological section

Table 5-5
Condition of Aquatic Features in the Great Valley Section of the Upper Tule Watershed

Water Feature (Area Measure)	Poor		Fair		Good		Total
	Acres/ Linear Feet	Percentage	Acres/ Linear Feet	Percentage	Acres/ Linear Feet	Percentage	
Canal/Ditch (LF)	1,908,047.6	92%	564.6	<1%	163,154.4	8%	2,071,766.6
Stream/River (LF)	936,686.5	59%	6,629.0	<1%	644,195.2	41%	1,587,510.6
Emergent Wetland (Ac)	342.4	42%	18.6	2%	461.5	56%	822.5
Forested/Shrub Wetland (Ac)	124.1	60%	3.5	2%	78.0	38%	205.5
Lake (Ac)	425.5	15%	—	—	2,377.5	85%	2,803.0
Other Wetlands (Ac)	14.6	51%	—	—	14.2	49%	28.8
Pond (Ac)	765.2	87%	—	—	113.5	13%	878.7
Riverine (Ac)	905.3	97%	7.2	1%	23.0	2%	935.5
Vernal Pool (Ac)	861.0	14%	—	—	5,510.2	86%	6,371.2

LF = linear feet
Ac = acres

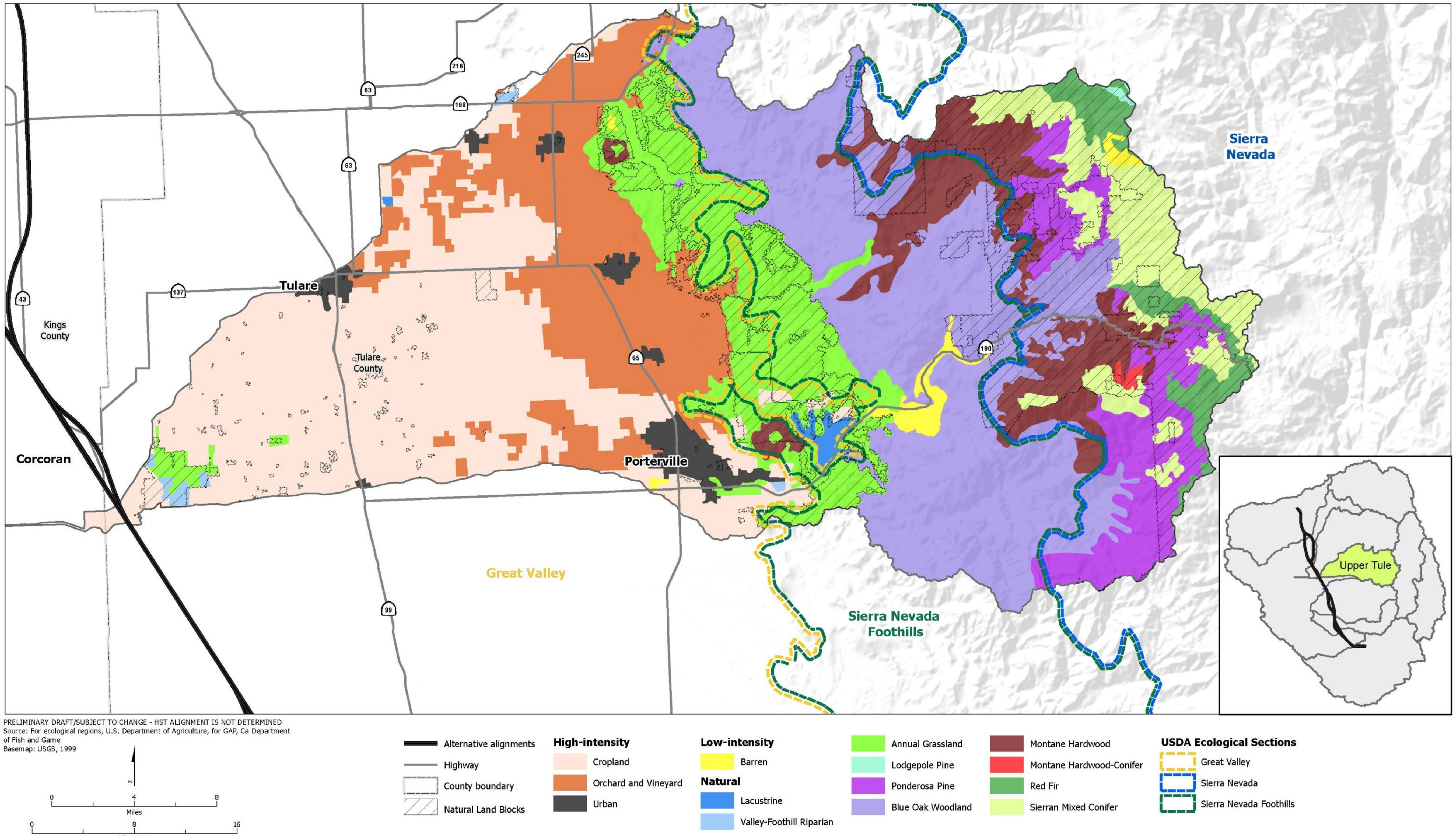

Figure 5-4a
Land use in the Upper Tule Watershed

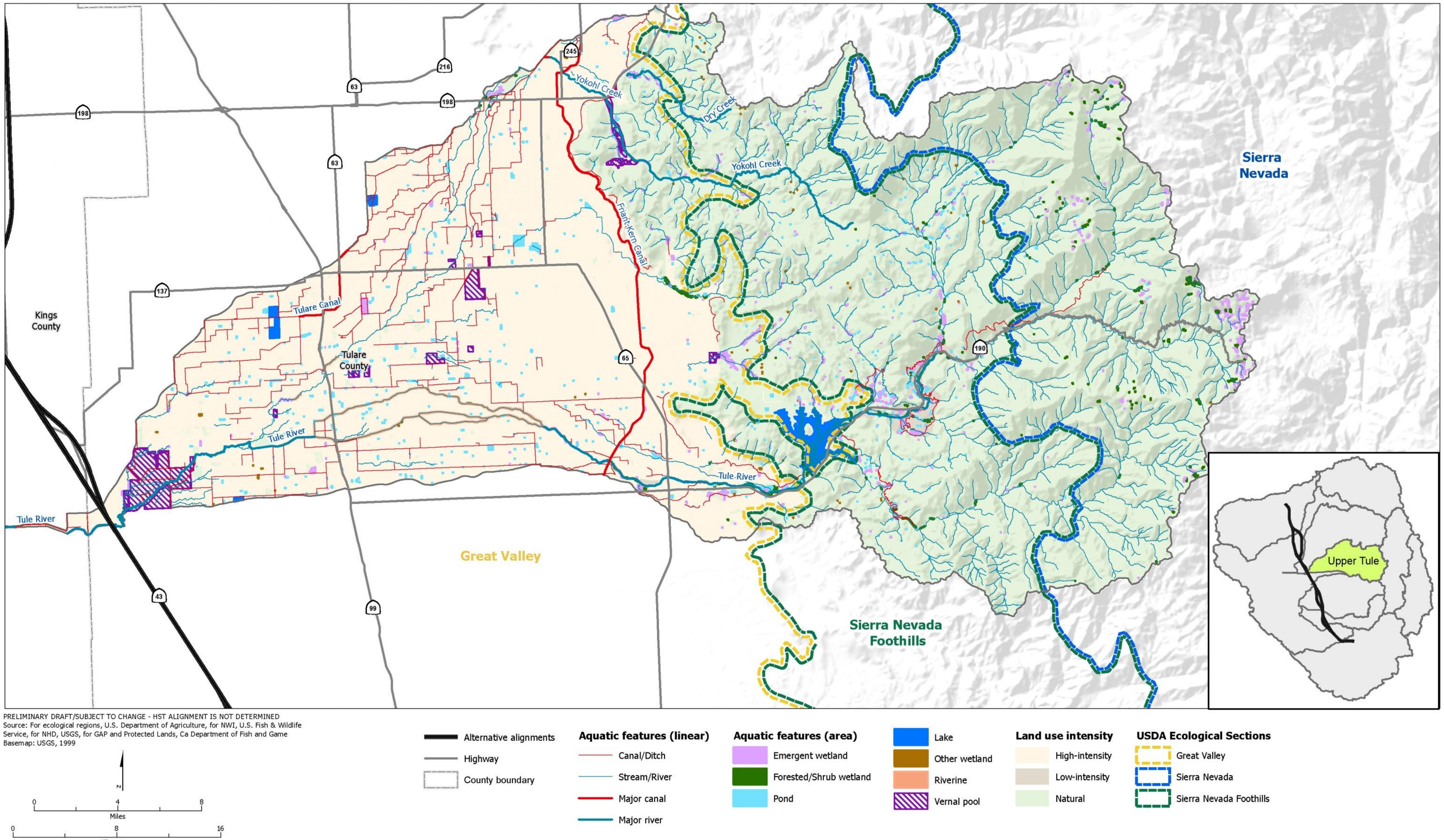

Figure 5-4b
Aquatic features in the Upper Tule Watershed

5.2.5 Upper Deer–Upper White Watershed

Deer Creek and the White River bring water from the Sierra Nevada to the Tulare Lake Basin in the Upper Deer–Upper White Watershed; both of these aquatic sources once flowed into the Tulare Lake bed but now are intermittent drainages on the Great Valley floor (EPA 2007). The Friant-Kern Canal crosses both Deer Creek and the White River as it runs north to south through the watershed. This watershed includes the Allensworth ER and the Pixley NWR area and some of the last remaining vernal pool complexes in the southern San Joaquin Valley.

The vernal pool ecosystems depend more on precipitation than on water carried from the headwaters. Vernal pools have developed in mostly isolated depressions that receive water from precipitation, local surface and shallow subsurface water, or sheet flow. Groups of adjacent pools are connected hydrologically via vernal swales and form complexes. Water is retained in these depressions by a shallow perching layer (largely claypans), and the water is unconnected or only partially connected to deeper groundwater layers (Holland 2009a). The vegetation, hydrology, and soils of these pools are unique because they occur in an alkali-scrub–type habitat rather than in true grassland, which is where the vernal pools to the north occur (Solomeshch et al. 2007).

The Fresno to Bakersfield Section alternative alignments intersect with the western portion of the Upper Deer–Upper White Watershed along the Great Valley floor. Approximately 21 miles of the 118-mile Fresno to Bakersfield section occurs in this watershed. Land use in this area includes significant areas of both natural lands and cropland (Figure 5-5a). Vernal pool features are mapped in both natural and high-intensity land uses and extend from Pixley NWR south and west across the HST alternative alignments (Figure 5-5b). Extant but fragmented natural areas occur along the Great Valley floor; these areas are primarily associated with Pixley NWR, Allensworth ER, and adjacent unprotected areas. Canals and ditches in the Great Valley section are in high-intensity land uses (i.e., croplands).

Chart 5-6 shows that most of the aquatic features that are in poor condition occur in the Great Valley. Relative to the other watersheds, proportionally more of the linear feet and acres in the Upper Deer–Upper White Watershed are in low-intensity land uses. This result may reflect the presence of protected wetlands in federal and state conservation areas. Linear features in the Sierra Nevada and the Sierra Nevada Foothills are in natural land uses.

Table 5-6 depicts the same trend: most aquatic features in the Sierra Nevada and the Sierra Nevada Foothills are in natural land use contexts. The situation in the Great Valley is more complex, with the ponds and canals/ditches in high-intensity land uses, and wetlands and vernal pools in mostly natural land uses.

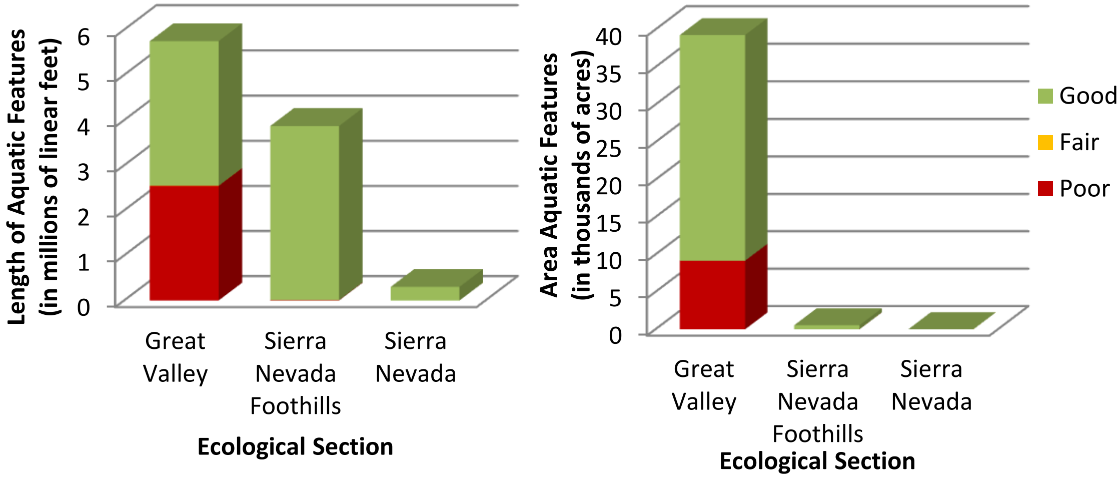

Chart 5-6
Area of aquatic features by conditions (in acres and linear feet) within the Upper Deer–Upper White Watershed grouped by ecological section.

Table 5-6
Condition of Aquatic Features in the Great Valley Section of the Upper Deer–Upper White Watershed

Water Feature (Area Measure)	Poor		Fair		Good		Total
	Acres/Linear Feet	Percentage	Acres/Linear Feet	Percentage	Acres/Linear Feet	Percentage	
Canal/Ditch (LF)	1,330,929.7	66%	2,957.0	<1%	683,751.5	34%	2,017,638.2
Stream/River (LF)	1,214,118.7	33%	—	—	2,515,305.3	67%	3,729,424.0
Emergent Wetland (Ac)	516.6	8%	—	—	5,594.4	92%	6,111.0
Forested/Shrub Wetland (Ac)	15.8	6%	—	—	245.4	94%	261.2
Lake (Ac)	766.8	19%	—	—	3,352.7	81%	4,119.6
Other Wetlands (Ac)	263.0	51%	—	—	254.1	49%	517.0
Pond (Ac)	570.4	92%	0.8	<1%	45.7	7%	616.9
Riverine (Ac)	410.0	59%	4.4	1%	282.8	41%	697.1
Vernal Pool (Ac)	6,626.9	25%	—	—	20,309.5	75%	26,936.4

LF = linear feet
Ac = acres

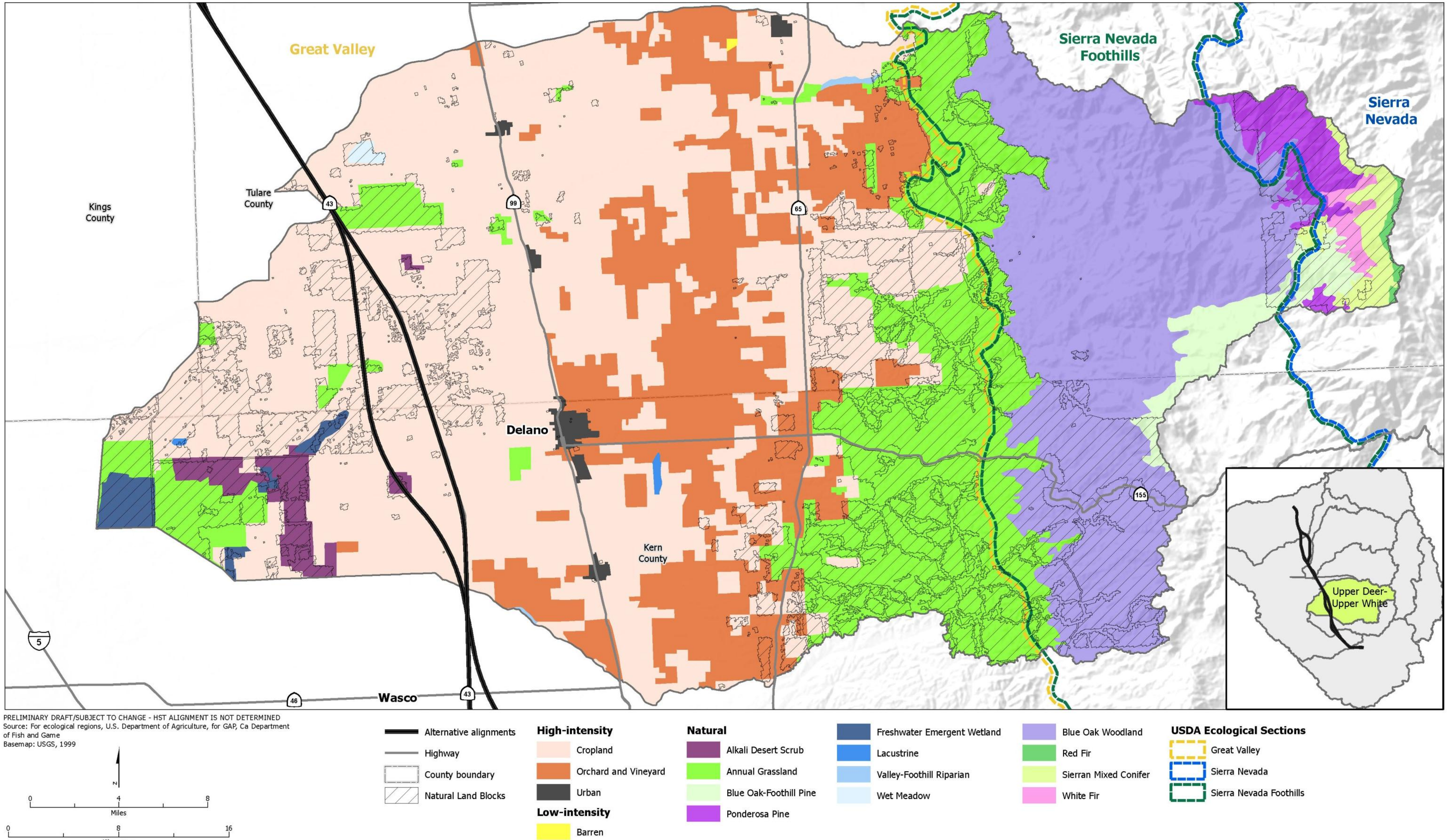

Figure 5-5a
Land use in the Upper Deer–Upper White Watershed

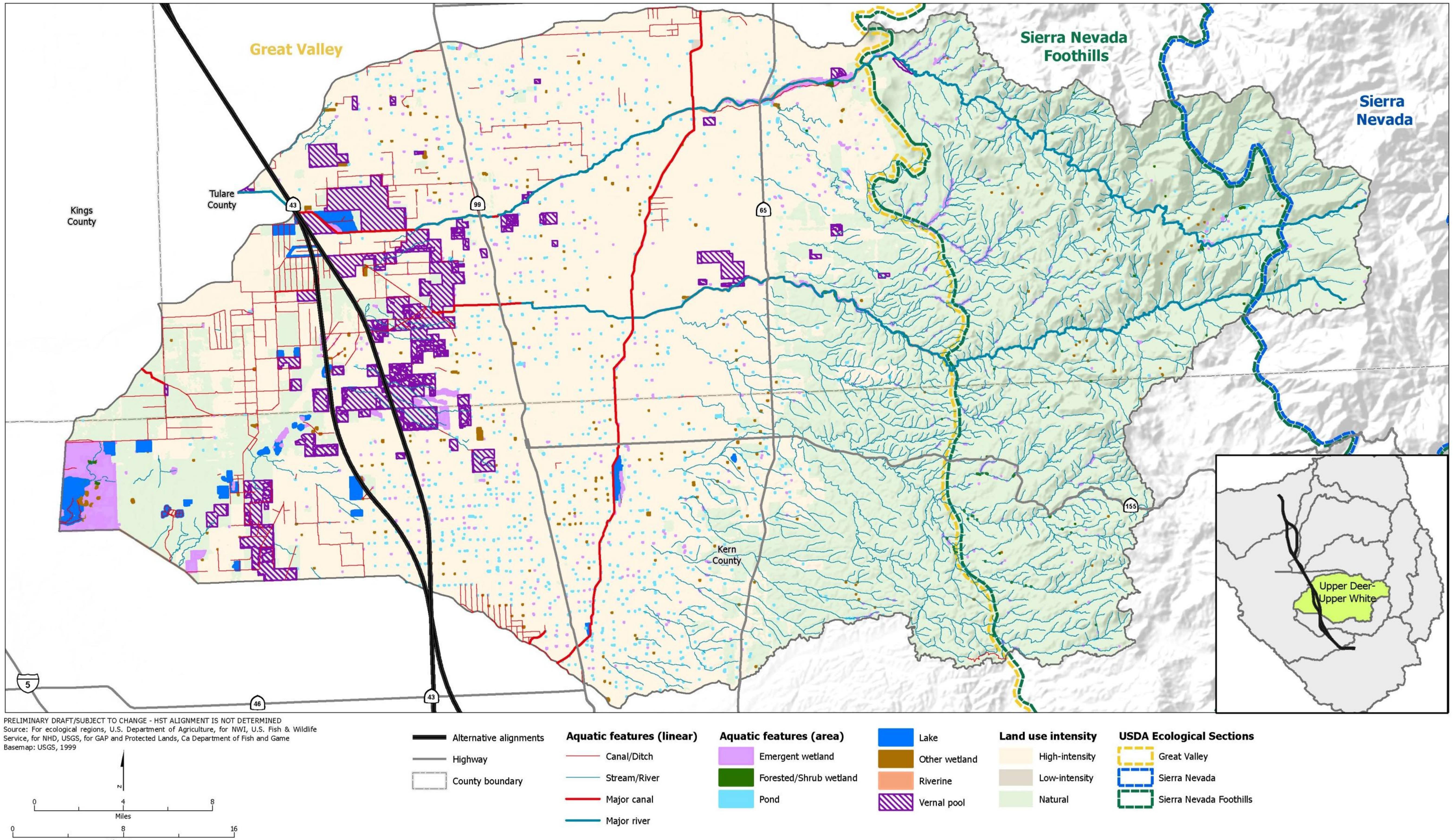

Figure 5-5b
Aquatic features in the Upper Deer–Upper White Watershed

5.2.6 Upper Poso Watershed

The Upper Poso Watershed features a single main creek, Poso Creek, which drains from its headwaters into the Central Valley, heading southwest. Poso Creek flows toward the Kern NWR, which is approximately 15 miles downstream of the study area (CVRWQCB 2007a).

The Fresno to Bakersfield alternative alignments are in the Great Valley Ecological Section of the Upper Poso Watershed. About 12 miles of the 118-mile Fresno to Bakersfield Section lay within this watershed. The areas within the watershed affected by the HST alternative alignments include urban Wasco and surrounding croplands and orchards (Figure 5-6a). The projected alignments will cross Poso Creek and modified ditches and canals (Figure 5-6b). The aquatic linear features and wetland acreages within the Sierra Nevada and the Sierra Nevada Foothills ecological sections are within natural habitat. Unlike most of the other watersheds profiled, most of the linear feet of aquatic features and wetland acreages in the Great Valley are in natural land uses (Chart 5-7).

The aquatic features in poor condition in the Great Valley are mostly canals, ditches, ponds and riverine features. Forested wetlands, streams and rivers, and vernal pools are found in low-intensity land contexts along the valley floor. All wetland features in the Sierra Nevada and the Sierra Nevada Foothills ecological sections are in good or fair areas (Table 5-7).

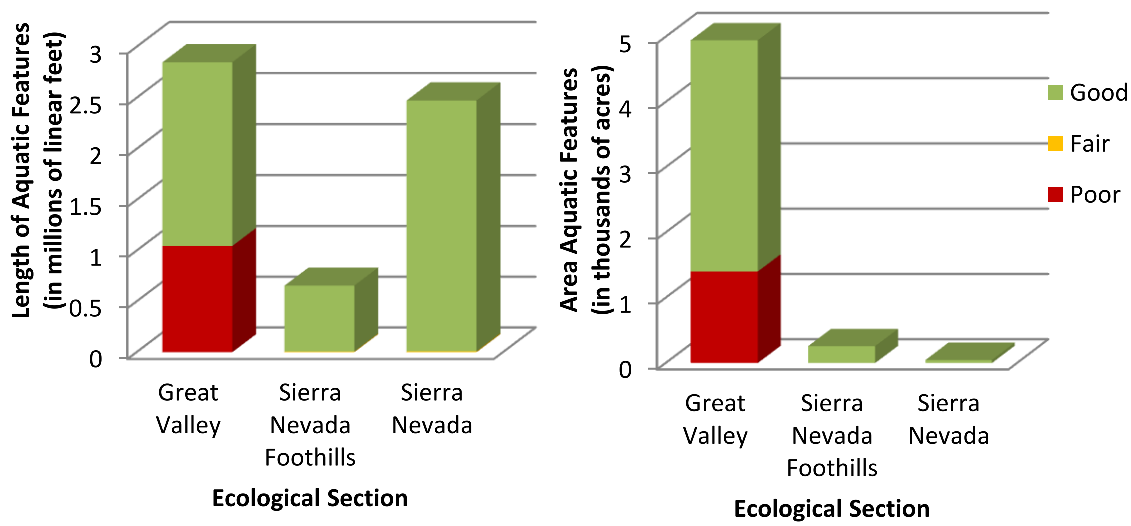

Chart 5-7
Area of aquatic features by condition (in acres and linear feet) within the Upper Poso Watershed grouped by ecological section.

Table 5.7
Condition of Aquatic Features in the Great Valley Section of the Upper Poso Watershed

Water Feature (Area Measure)	Poor		Fair		Good		Total
	Acres/Linear Feet	Percentage	Acres/Linear Feet	Percentage	Acres/Linear Feet	Percentage	
Great Valley							
Canal/Ditch (LF)	733,818.4	94%	—	—	44,889.0	6%	778,707.3
Stream/River (LF)	312,687.4	15%	—	—	1,757,952.0	85%	2,070,639.4
Emergent Wetland (Ac)	110.1	27%	—	—	292.1	73%	402.2
Forested/Shrub Wetland (Ac)	16.8	3%	—	—	531.5	97%	548.3
Lake (Ac)	402.2	62%	—	—	248.1	38%	650.2
Other Wetlands (Ac)	35.7	8%	—	—	405.8	92%	441.5
Pond (Ac)	277.9	88%	—	—	37.3	12%	315.2
Riverine (Ac)	426.4	78%	—	—	117.2	22%	543.6
Vernal Pool (Ac)	133.9	7%	—	—	1,911.1	93%	2,045.1

LF = linear feet
Ac = acres

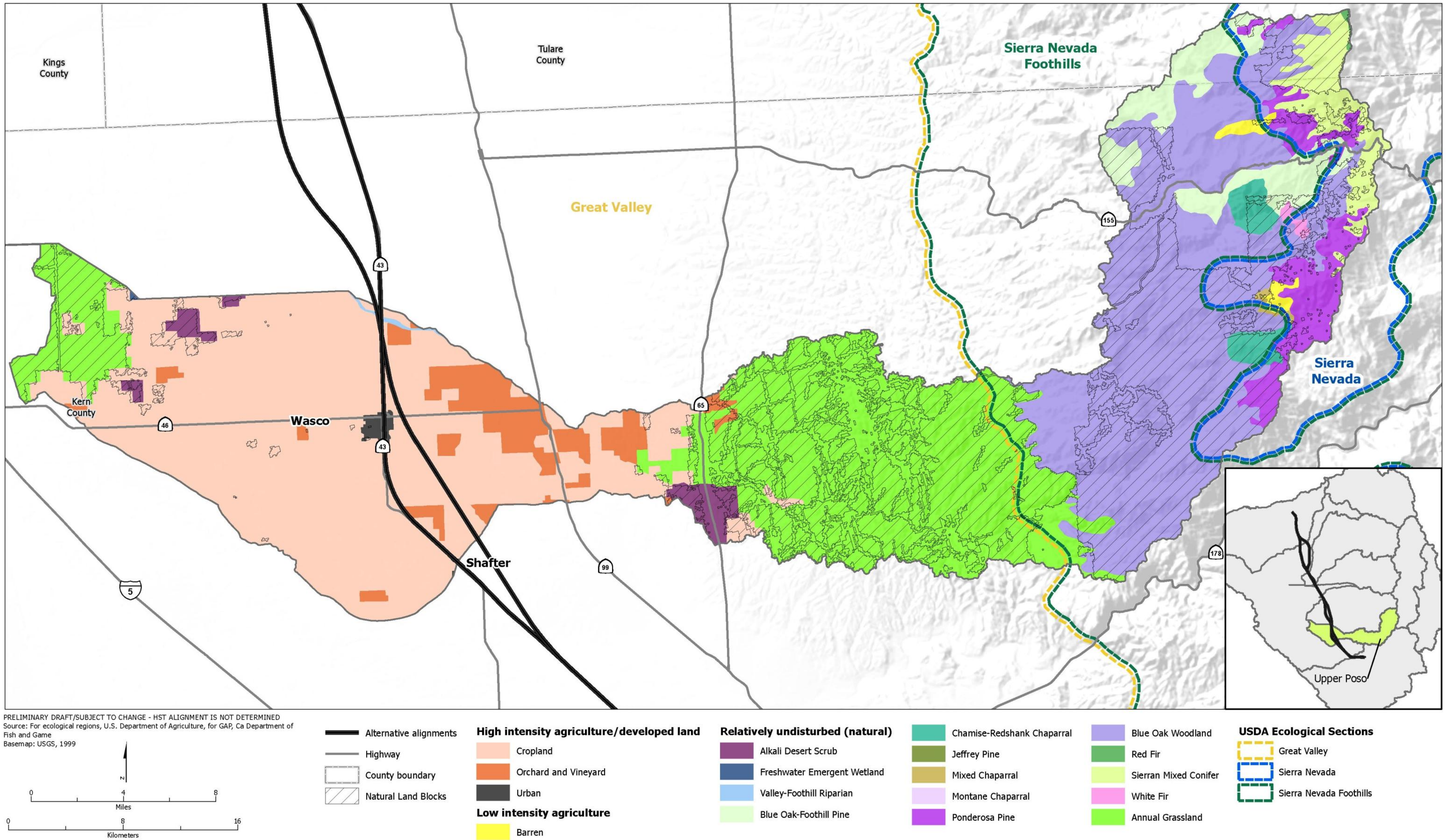

Figure 5-6a
Land uses in the Upper Poso Watershed

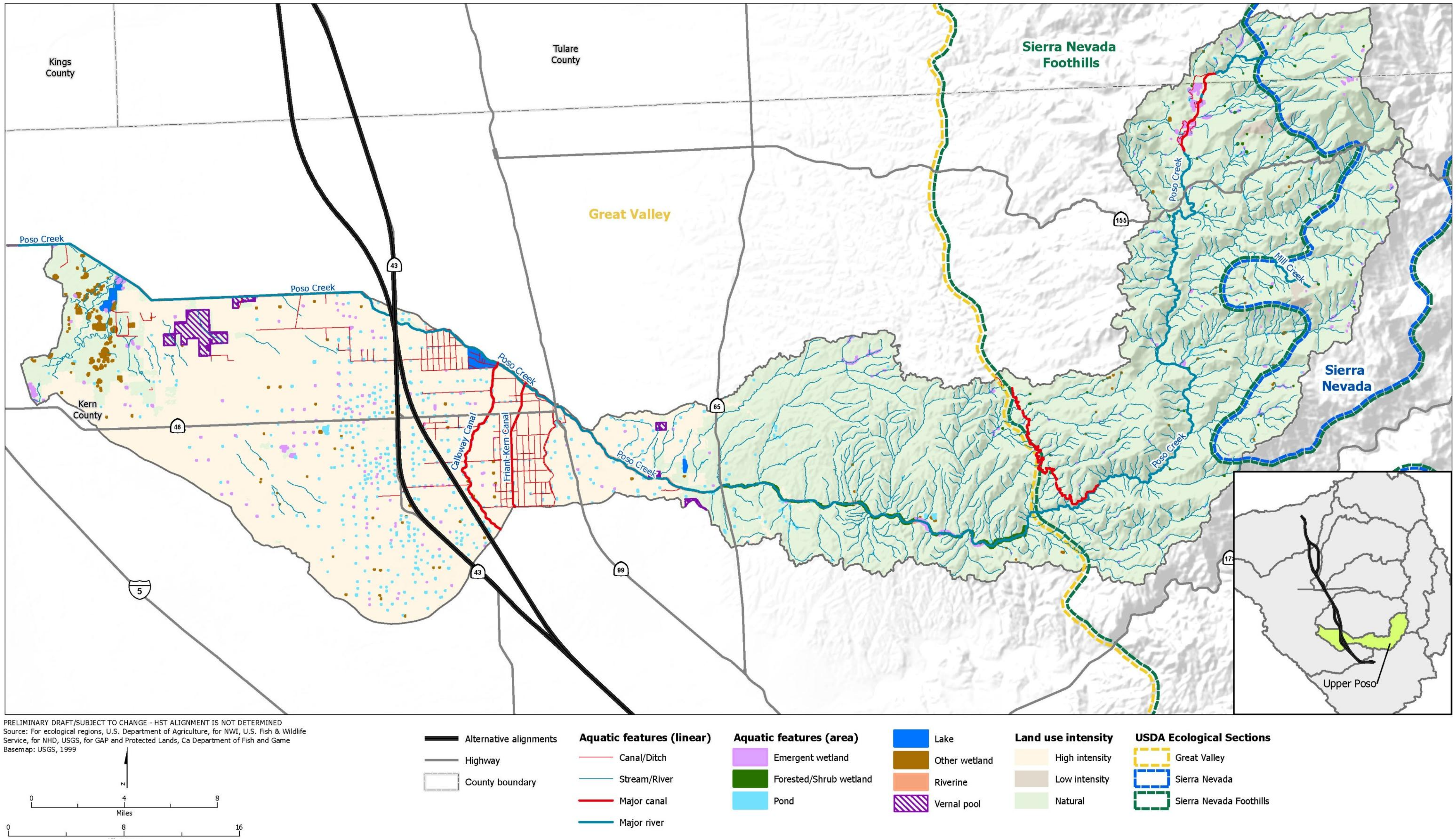

Figure 5-6b
Aquatic features in the Upper Poso Watershed

5.2.7 Middle Kern–Upper Tehachapi–Grapevine Watershed

The Kern River runs along the northern areas of the Middle Kern–Upper Tehachapi–Grapevine Watershed. The Kern River is second only to the Kings River in amount of runoff it drains and has the largest drainage basin of all the major Tulare Lake Basin rivers. The waters of the Upper Kern River are held back by Isabella Dam, at the junction of the south fork and the main stem of the river (EPA 2007). Below the dam, near Bakersfield, the Kern River flows are distributed into a series of canals. High-water flows that are not used for groundwater recharge eventually terminate in historical Buena Vista Lake. The Friant-Kern Canal terminates at the Kern River (EPA 2007).

The Fresno to Bakersfield Section alternative alignments only intersect this watershed in urban Bakersfield (Figure 5-7a), though the alignments do cross the Kern River (Figure 5-7b). About 8 miles of the 118-mile Fresno to Bakersfield Section occurs in the Middle Kern–Upper Tehachapi–Grapevine Watershed.

This watershed encompasses five ecological sections, though the areas affected by the alternative alignments are restricted to the Great Valley Ecological Section. Like most of the other watersheds profiled, the aquatic linear and wetland acreages in the Sierra Nevada, Sierra Nevada Foothills, Coast Ranges, and Mountain and Valley ecological sections are generally in low-intensity and natural land uses. The wetlands within the Great Valley Ecological Section have been altered to a greater degree (Chart 5-8).

The canals and ditches and vernal pools in the valley are in poor land contexts (Table 5-8). Most of the forested wetlands and stream/rivers in the valley are in natural land contexts. Unlike most of the other watersheds, the vernal pools in the Sierra Nevada Ecological Section are mostly in poor landscapes. This discrepancy possibly reflects the vernal pools in agricultural development and urbanization around the city of Tehachapi, near SR 202.

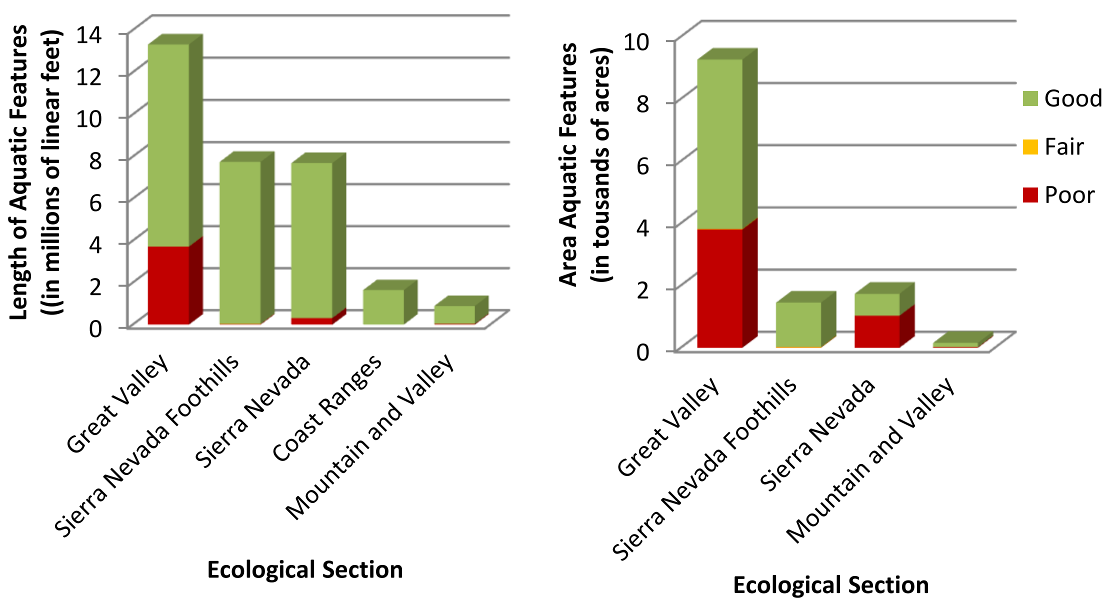

Chart 5-8
Area aquatic features by condition (in acres and linear feet) within the Middle Kern–Upper Tehachapi–Grapevine Watershed grouped by ecological section.

Table 5-8
Condition of Aquatic Features in the Great Valley Section of the Middle Kern–Upper Tehachapi–Grapevine Watershed

Water Feature (Area Measure)	Poor		Fair		Good		Total
	Acres/ Linear Feet	Percentage	Acres/ Linear Feet	Percentage	Acres/ Linear Feet	Percentage	
Great Valley							
Canal/Ditch (LF)	2,736,732.2	82%	—	—	617,199.7	18%	3,353,931.9
Stream/River (LF)	982,332.0	10%	5,211.4	<1%	8,976,064.3	90%	9,963,607.8
Emergent Wetland (Ac)	369.2	55%	1.7	<1%	304.0	45%	674.9
Forested/Shrub Wetland (Ac)	101.1	19%	4.9	1%	436.1	80%	542.2
Lake (Ac)	1,420.7	47%	—	—	1,576.8	53%	2,997.5
Other Wetlands (Ac)	482.1	32%	11.8	1%	1,008.6	67%	1,502.6
Pond (Ac)	765.7	67%	0.3	<1%	369.6	33%	1,135.7
Riverine (Ac)	606.3	26%	—	—	1,731.0	74%	2,337.3
Vernal Pool (Ac)	60.2	79%	—	—	15.8	21%	76.0

LF = linear feet
Ac = acres

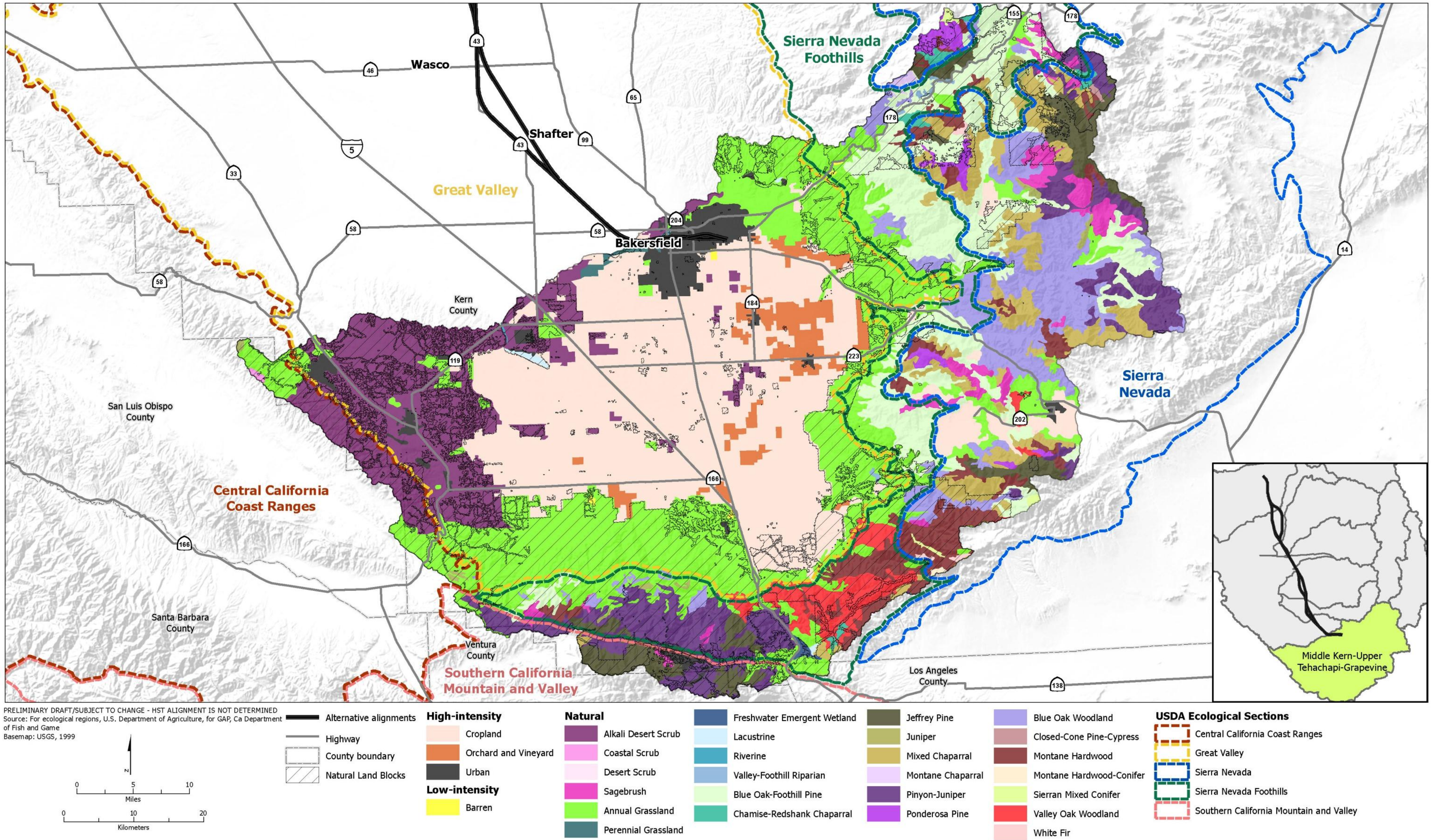

Figure 5-7a
Land use in the Middle Kern–Upper Tehachapi–Grapevine Watershed

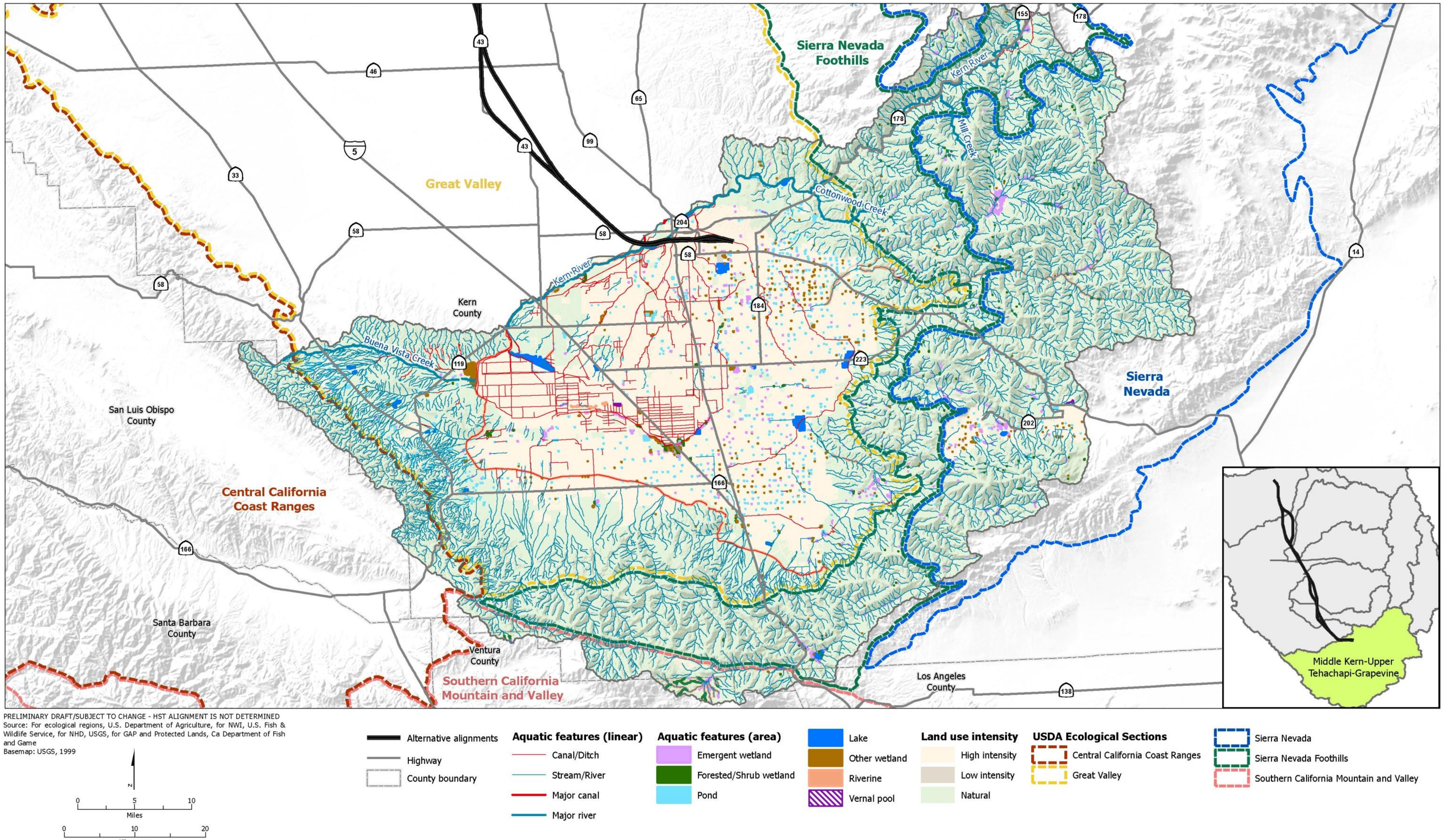

Figure 5-7b
Aquatic features in the Middle Kern–Upper Tehachapi–Grapevine Watershed

5.3 Watershed Profile Discussion

The watersheds within the Tulare Lake Basin cover a large and diverse area of California. In a few instances, differences in the features and conditions of the watersheds are identified through the development and presentation of the watershed profiles. On a larger, landscape level, the similarities across the watersheds in the Tulare Lake Basin are relatively consistent across the ecological sections. The profiles of each of the watersheds in the study area for the Fresno to Bakersfield Section alternatives share many similarities across the Tulare Lake Basin.

The headwaters of all of the watersheds profiled are mostly protected. In the Sierra Nevada, the Sierra Nevada Foothills, and the Coast Ranges ecological sections, impacts that degrade the quality of aquatic features are mostly dams and their associated reservoirs. Proportionally, these ecological sections do not contribute nearly as much linear feet and acreage of aquatic features as the Great Valley Ecological Section.

Most of the impacts to aquatic resources occur in the Central Valley: throughout the Tulare Lake Basin and across all the watersheds profiled, the valley has largely been manipulated through the conversion of land to agricultural, urban development, and transportation uses. These conversions have resulted in the loss, manipulation, and degradation of aquatic resources through upper watershed impoundments, removal of riparian vegetation, and other hydrological manipulations (e.g., pumping, siphoning, diverting, filling, dredging, plowing of aquatic resources). These activities have resulted in the extensive reduction of riparian habitat, the accretion of streams, and the loss of Tulare Lake, Buena Vista Lake, and Kern Lake as well as other sensitive aquatic features (emergent wetlands, vernal pools and swales).

Furthermore, the historical and current land use patterns have blurred the boundaries of the watersheds through the construction of extensive networks of irrigation canals and ditches. As water moves to the Great Valley, increasing amounts of water are diverted from natural stream and river systems to highly modified canals and ditches. In the Great Valley Ecological Section, high-intensity land uses have had two primary effects on aquatic features: linear features have been converted into canals and ditches and (2) where water historically flowed east to west from the headwaters into the valley floor, the Great Valley is now primarily demarcated by two north to south features, the California Aqueduct and the Friant-Kern Canal. Although not reflected in this analysis, the acreages of aquatic features in the Great Valley have been drastically decreased from their historical distributions. This decrease is perhaps most dramatically evident in the loss of the four historical lake basins: the Tulare, Goose, Buena Vista, and Kern lakes. To illustrate the blurred boundaries between the watersheds, Table 5-9 summarizes the NHD-named linear features that occur in more than one watershed for more than 0.5 mile.

Table 5-9
Summary of NHD-Named Features That Occur in Multiple Watersheds

NHD-Named Feature	HUC-8 Watershed						
	Upper Dry	Tulare–Buena Vista Lakes	Upper Kaweah	Upper Tule	Upper Deer–Upper White	Upper Poso	Middle Kern–Upper Tehachapi–Grapevine
Alta East Branch Canal		X	X				
Calloway Canal		X	X	X		X	X
Cameron Creek			X	X			
Cole Slough	X	X					

Table 5-9
Summary of NHD-Named Features That Occur in Multiple Watersheds

NHD-Named Feature	HUC-8 Watershed						
	Upper Dry	Tulare–Buena Vista Lakes	Upper Kaweah	Upper Tule	Upper Deer–Upper White	Upper Poso	Middle Kern–Upper Tehachapi–Grapevine
Cross Creek		X	X				
Deep Creek Cut			X	X			
East Branch Cross Creek			X	X			
East Branch Lakeside Ditch		X	X				
Enterprise Canal	X	X					
Fowler Switch Canal	X	X					
Friant-Kern Canal		X	X	X	X	X	X
Kimble Ditch		X	X				
Lewis Ditch		X	X				
McCall Ditch	X	X					
Middle Branch Cross Creek			X	X			
Mill Ditch	X	X					
North Fork Kings River	X	X					
Outlet Canal	X	X					X
Poplar Ditch	X	X		X			
Poso Canal	X	X			X		
Poso Creek	X	X			X	X	
Railroad Ditch	X		X	X			
Settlers Ditch		X	X				
South Branch Summit Lake Ditch	X	X					
Taylor Canal		X		X			
Tulare Lake Canal		X		X			
Tule River		X		X			
Wilbur Ditch		X		X			
Total	12	23	13	12	3	3	3

NHD = National Hydrography Dataset
HUC-8 = Hydrologic Unit Code 8

Due to the linear nature and north-to-south orientation of the Fresno to Bakersfield Section, impacts to aquatic features occur across all seven watersheds. Many of these watersheds and their respective aquatic features are minimally disturbed by the project (the total disturbance from the project in all watersheds in the Great Valley is approximately 0.25%). A number of the

Fresno to Bakersfield alternatives have relatively small footprints within a few different watersheds. For example, the footprints of the Hanford West Bypass 1 and 2 alternatives occur in three watersheds (the Upper Dry, Tulare–Buena Vista Lakes, and Upper Kaweah watersheds) but cover an area of less than 0.1% of the total area of these watersheds.

Some of the differences between the watersheds are important to note for the purposes of impact evaluation and mitigation planning. The vernal pool landscapes, which are sensitive, difficult to replace, and generally in good condition, are primarily in the Upper Deer–Upper White Watershed (26,936 acres). The vernal pool landscapes in the three other watersheds with the most vernal pool landscapes are as follows: Upper Dry Watershed (16,966 acres), Tulare–Buena Vista Lakes Watershed (11,237 acres), Upper Kaweah Watershed (13,736 acres). Although the vernal pool landscapes are not as prevalent in these three other watersheds, they occupy six times the total land area as the Upper Deer–Upper White Watershed (4,760,678 vs. 783,532 acres). Al though the Upper Deer–Upper White Watershed is not the largest watershed, the vernal pool landscapes are most prevalent (densest) in this watershed, and it has a high percentage of vernal pool landscapes in good condition (75%).

The Fresno to Bakersfield Section of California HST System occurs entirely within the Great Valley Ecological Section. The project impact profile and the subsequent compensatory mitigation are similar across all seven watersheds, except perhaps the Upper Deer–Upper White Watershed. The Upper Deer–Upper White Watershed contains a significantly greater area (acres) of vernal pool landscapes (both in terms of number of acres and percentage of total watershed area) and for this reason should be a focus of compensatory mitigation efforts.

The 2008 Mitigation Rule states a preference for mitigation using a watershed approach, but acknowledges that for linear projects, where impacts are distributed across multiple watersheds, more ecological functions and values may be created, enhanced, or restored in fewer, consolidated mitigation projects. Because of the degraded condition of aquatic resources in the region, the focus of the compensatory mitigation should be consolidated mitigation projects, which would provide the best opportunity to benefit the region, such as restoring the historical Tulare Lake and associated emergent wetlands. The compensatory mitigation may also be consolidated in the watershed or watersheds that would experience significant ecological loss of aquatic resources in excellent or good condition.

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Section 6.0
Results: Impact Evaluations

6.0 Results: Level 2 Impact Evaluation

This section describes the impacts of the Fresno to Bakersfield Section on aquatic resources, the existing conditions of those resources, the findings of the relative condition assessment of these resources, the post-project condition of those resources, and the compensatory mitigation required to offset negative effects to those resources. The impact evaluation is conducted for each of the Fresno to Bakersfield Section alternatives. The impact profile has three components: direct-permanent impacts, direct-temporary impacts (in areas where the impact would occur only during construction), and the indirect-bisected and indirect impacts within the construction and project footprints (250-foot buffer). This section uses tables and figures to describe, illustrate, and summarize the results of the data analysis methodology described in Section 3.2, Methodology: Existing Conditions, Section 3.3, Methodology: Impact Calculations, and Section 3.4, Methodology: Post-Project Condition.

Using the Level 1 Watershed Profiles developed in Chapter 5 and Level 2 condition assessment and impact evaluation, a comparison was made to determine whether the impacted aquatic resources along each alternative alignment are "typical" of the watershed or whether the impacts would result in significant adverse impacts on sensitive aquatic resources that are rare or unique to the watershed.

The Level 2 Impact Evaluation was largely developed through GIS-based modeled outputs, which established a set of projections, along with a select set of modifications (where features don't follow the projections based on best professional judgment). The projections and modifications are described in detail in Chapter 3. The development of the model allows for relatively quick recalculation of impacts, existing conditions, and post-project conditions as the alternative alignments and the engineer's design evolves. The data used—and included in this report—are based on the footprints associated with the June 2012 engineering design in the *Fresno to Bakersfield Section: Revised Draft EIR / Supplemental Draft EIS* (Authority and FRA 2012a).

Additional information and details regarding existing conditions (i.e., the results of CRAM) can be found in Appendix A. This report summarizes the methods used, the field work, and the overall CRAM scores and attribute scores for the aquatic resources in the study area.

The Compensatory Mitigation Plan provides a summary of the compensatory mitigation requirements and identifies potential compensatory mitigation properties and options. The Compensatory Mitigation Plan also identifies the mechanism, long-term management, and instruments the Authority will use to offset the loss of aquatic resources such that no net loss of aquatic functions or values will be incurred as a result of the Fresno to Bakersfield Section.

6.1 Impacts on Aquatic Resources

Impacts to special aquatic resources are described in a number of technical reports and planning documents including the *Fresno to Bakersfield Section: Revised Draft EIR / Supplemental Draft EIS* (FRA and Authority 2012a), *Fresno to Bakersfield Biological Resources and Wetlands Technical Report* (Authority and FRA 2012b), and the Checkpoint C Summary Report (Authority and FRA 2012e). Central to all discussion regarding impacts to the aquatic resources is the step wise process to first take steps to avoid impacts to aquatic resources, minimize those impacts that cannot be avoided, document the extent of aquatic resource encroachment and mitigate to the extent that there is no net loss of aquatic functions or services. The step wise process to avoid and minimize impacts to aquatic resources is well documented in Chapter 2 of the *Fresno to Bakersfield Section: Revised Draft EIR / Supplemental Draft EIS* (Authority and FRA 2012a), the *Fresno to Bakersfield Section: Checkpoint C Summary Report* (Authority and FRA 2012e), and the *Fresno to Bakersfield Section: Section 404 Individual Permit Application* (Authority and FRA 2012f).

6.1.1 Watershed Evaluation

As discussed in Section 5.3, Watershed Profile Discussion, the watersheds present in the Fresno to Bakersfield Section of the HST have similar types of features and environmental conditions. The watershed boundaries have largely been blurred through high-intensity land conversion and development, leaving few aquatic features in natural landscapes within the Great Valley. It is difficult to present a meaningful comparison of watershed-level impacts because of the north-south orientation and linear nature of the HST project, and the numerous (9) HST alternatives under consideration. Because the watersheds are similar, the presentation and analysis of impacts by watershed does not provide for a meaningful comparison of information that would be used to make project decisions. Where differences in watershed profile arise, those impacts are presented and discussed separately throughout this subsection. This is the case primarily for the concentrations and impacts to vernal pool features in the Upper Deer–Upper White Watershed.

However, understanding project impacts by watershed may be useful in mitigation planning and understanding where impacts to sensitive aquatic resources (or those in good condition) occur. While a comparison by alternative is not possible, Table 6-1 provides the range of potential project impacts that could occur to given type of aquatic resource by watershed. A range is presented because there are several HST alternatives that occur in each watershed, and depending on which alternative is ultimately selected as the least environmental damaging practicable alternative, the impacts to a given watershed would vary. This table should only be used for a coarse understanding of the watersheds and the distribution and types of features that are present and the understanding of the range of potential direct and indirect impacts.

In general, the range and of potential impacts to manipulated or man-made aquatic resources are similar across all watersheds. Of important note, vernal pool and swale impacts primarily occur in the Upper Deer–Upper White Watershed, where there are concentrations and extensive vernal pool landscapes, as described in Section 5.2.5, Upper Deer–Upper White Watershed, and Section 5.3, Watershed Profile Discussion. Other watersheds may experience loss of vernal pools but these losses are small and less significant when compared against those in the Upper Deer–Upper White Watershed. Because all watersheds contain a dominant seasonal riverine feature that runs east-west and the Fresno to Bakersfield Section runs north-south, impacts to seasonal riverine feature are similar across the watersheds.

Table 6-1
Range of Direct and Indirect Impacts to Aquatic Resources by Watershed

Watershed	Impact Type	Range of Impact Acreage by Aquatic Resource (acres)							
		Emergent Wetland	Vernal Pools and Swales	Seasonal Wetland	Canals/ Ditches	Lacustrine	Seasonal Riverine	Riparian[A]	Total
Upper Dry	Direct	—	—	0.67	4.05–4.13	1.15–1.15	0.00–0.39	0.00–0.95	5.87–7.29
	Indirect	—	0.05	—	4.94–5.29	12.14	0.00–0.79	0.00–2.64	17.13–20.91
Tulare–Buena Vista Lakes	Direct	—	0.60	0.66–0.67	20.85–28.21	10.09–11.67	0.41–1.50	0.73–2.54	33.34–45.19
	Indirect	0.00–0.92	4.13–4.58	6.63	41.47–50.77	13.90–28.96	2.77–12.85	6.41–17.66	75.31–122.37
Upper Kaweah	Direct	—	0.00–1.09	—	5.89–11.38	0.00–0.72	0.22–2.52	—	6.11–15.72
	Indirect	—	0.00–1.32	1.55–5.48	7.74–17.61	0.79–5.20	1.17–1.28	—	11.25–30.89
Upper Tule	Direct	—	0.00–1.19	0.00–0.43	1.04–1.27	0.65–3.67	0.24–0.28	0.38–0.71	2.31–7.55
	Indirect	—	0.00–0.74	0.01–1.20	0.20–0.44	<0.01–2.57	0.80–2.72	1.02–1.84	2.03–9.51
Upper Deer–Upper White	Direct	—	1.07–9.44	0.12–0.70	4.92–6.20	18.38–21.25	0.14–0.14	0.12–0.31	24.75–38.04
	Indirect	—	11.08–33.77	13.52–49.79	6.66–7.45	89.98–104.15	0.70–0.79	0.65–0.72	122.59–196.67

Table 6-1
Range of Direct and Indirect Impacts to Aquatic Resources by Watershed

Watershed	Impact Type	Range of Impact Acreage by Aquatic Resource (acres)							
		Emergent Wetland	Vernal Pools and Swales	Seasonal Wetland	Canals/ Ditches	Lacustrine	Seasonal Riverine	Riparian[A]	Total
Upper Poso	Direct	—	—	—	0.11–2.18	1.31–3.48	0.10–0.16	0.33–0.83	1.85–6.65
	Indirect	—	—	—	0.85–3.33	2.40–6.15	0.49–0.85	1.87–3.34	5.61–13.67
Middle Kern–Upper Tehachapi–Grapevine	Direct	—	—	0.00–0.11	2.39–3.92	0.90–2.10	1.48–2.24	0.25–0.82	5.01–9.19
	Indirect	0.00–<0.01	0.05–0.13	—	9.63–11.88	3.72–7.96	12.40–19.98	3.66–8.16	29.46–48.11

Notes:
— = No impact or not applicable
[A] Riparian areas are not jurisdictional waters of the U.S.

6.1.2 Alternative Evaluation

To assist in determining the least environmentally damaging practicable alternative, that is, the LEDPA, impacts to aquatic features must be described in terms of the Fresno to Bakersfield Section alternatives. Impacts are presented in a manner that allows for a comparison of the alternatives. Under the BNSF Alternative, the acreage reflects the total impact that would occur along the only end-to-end alternative. The BNSF Alternative is made up of eight segments (BNSF–Fresno, BNSF–Hanford East, BNSF–Through Corcoran, BNSF–Pixley, BNSF–Through Allensworth, BNSF–Through Wasco-Shafter, BNSF–Monmouth, and BNSF–Bakersfield North), five of which have alternatives (BNSF–Hanford East, BNSF–Through Corcoran, BNSF–Through Allensworth, BNSF–Through Wasco-Shafter, and BNSF–Bakersfield North) and three of which do not have alternatives (BNSF–Fresno, BNSF–Pixley, and BNSF–Monmouth). The three segments that do not have alternatives are referred to as "common components" and would be part of the project regardless of which alternatives are selected. The segments of the BNSF Alternative and their corresponding alternatives are listed in Table 6-2.

Table 6-2
Segments of the BNSF Alternative and Their Corresponding Alternatives

BNSF Alternative–Segment	Corresponding Alternative
BNSF–Fresno	No alternative
BNSF–Hanford East	Hanford West Bypass 1 (at-grade and below-grade options) Hanford West Bypass 2 (at-grade and below-grade options)
BNSF–Through Corcoran	Corcoran Elevated Corcoran Bypass
BNSF–Pixley	No alternative
BNSF–Through Allensworth	Allensworth Bypass
BNSF–Through Wasco-Shafter	Wasco-Shafter Bypass
BNSF–Monmouth	No alternative
BNSF–Bakersfield North	Bakersfield South Bakersfield Hybrid

The amount of encroachments on aquatic resources varies among the alternatives (Table 6-3). This table only lists the potential impacts to aquatic resources from a given alternative; the table does not include or consider the associated watershed. To compare the other project alternatives and design options for each of the other alternatives, the table contains two numbers: the first number is the amount of impact anticipated for the given alternative, and the second number is the change (or delta) when this number is compared against the corresponding segment of the BNSF Alternative. Comparison tables differentiate impact acreages between an alternative alignment and its corresponding segment of the BNSF Alternative: positive (+) differences indicate that the alternative alignment results in a greater number of impact acres than its corresponding segment of the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in a smaller number of impact acres than its corresponding segment of the BNSF Alternative.

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Table 6-3
Comparison of Impacts on Aquatic Resources by Alternative

Aquatic Resource Type	Impact Type [a]	Alternative										
		BNSF Alternative Impact Acreage	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
			Impact Acreage / Difference Compared with Corresponding BNSF Area [b]									
Emergent wetland	Direct-Permanent	—	—	—	—	—	—	—	—	—	—	—
	Direct-Temporary	—	—	—	—	—	—	—	—	—	—	—
	Indirect	<0.01	0.59 / +0.59	0.59 / +0.59	0.92 / +0.92	0.92 / +0.92	—	—	—	—	— / -<0.01	<0.01 / 0.00
Seasonal wetland	Direct-Permanent	1.32	0.01 / +0.01	0.01 / +0.01	—	—	0.05 / +0.05	0.43 / +0.43	0.12 / -0.43	—	0.01 / -0.11	0.01 / -0.12
	Direct-Temporary	*0.82*	—	—	—	—	—	—	*— / -0.16*	—	—	—
	Indirect	40.13	0.45 / +0.45	0.45 / +0.45	0.45 / +0.45	0.45 / +0.45	2.14 / -0.05	0.13 / -2.06	10.75 / -22.69	—	0.55 / -0.08	0.55 / -0.08
Vernal pools and swales	Direct-Permanent	11.59	—	—	—	—	1.09 / -0.46	1.19 / -0.36	1.05 / -8.37	—	—	—
	Direct-Temporary	—	—	—	—	—	—	—	—	—	—	—
	Indirect Bisected	23.88	—	—	—	—	4.76 / -0.73	— / -5.49	1.73 / -15.52	—	—	—
	Indirect	38.61	—	—	—	—	1.78 / +1.19	1.56 / +0.97	11.58 / -20.75	—	—	—
Canals/Ditches	Direct-Permanent	44.81	14.35 / +7.45	13.21 / +6.31	10.54 / +3.64	9.40 / +2.50	9.29 / -4.93	8.37 / -5.85	5.84 / -1.28	1.98 / -1.86	2.27 / +0.43	2.96 / +1.12
	Direct-Temporary	*3.50*	*0.11 / -0.39*	*0.11 / -0.39*	*0.21 / -0.29*	*0.21 / -0.29*	*0.90 / +0.02*	*1.02 / +0.14*	—	*0.06 / +0.04*	*1.03 / +0.46*	*0.98 / +0.41*
	Indirect	75.18	21.61 / +8.75	20.86 / +8.00	21.53 / +8.68	20.78 / +7.92	19.16 / +8.24	14.13 / +3.20	24.12 / -0.72	5.82 / -1.99	11.89 / +2.26	11.63 / +1.99
Lacustrine (Retention/Detention Basins and Reservoirs)	Direct-Permanent	33.27	0.53 / -0.35	0.35 / -0.54	0.51 / -0.37	0.32 / -0.56	4.00 / -0.78	3.64 / -1.14	16.28 / -3.97	2.80 / -1.41	1.82 / -0.32	1.82 / -0.32
	Direct-Temporary	*7.53*	—	—	—	—	—	*3.55 / +3.55*	*2.45 / +1.14*	*1.10 / -1.50*	*1.91 / -0.64*	*1.91 / -0.64*
	Indirect	139.66	6.34 / +1.91	0.79 / -3.64	17.61 / +13.18	12.05 / +7.62	11.37 / +0.11	8.09 / -3.16	104.37 / +14.06	6.52 / -5.23	4.35 / -4.16	4.04 / -4.47
Seasonal riverine	Direct-Permanent	5.88	0.71 / -3.31	0.52 / -3.50	1.12 / -2.91	0.93 / -3.09	0.24 / 0.00	0.14 / -0.10	0.14 / -0.14	—	0.83 / -0.50	0.83 / -0.50
	Direct-Temporary	*0.92*	*0.50 / +0.50*	*0.50 / +0.50*	*0.50 / +0.50*	*0.50 / +0.50*	—	*0.14 / +0.14*	*0.10 / +0.08*	—	*0.65 / -0.26*	*0.64 / -0.26*
	Indirect	36.63	5.32 / -8.81	4.74 / -9.40	5.40 / -8.73	4.81 / -9.32	0.80 / -0.17	2.72 / +1.75	1.27 / -0.28	—	12.40 / -7.58	12.40 / -7.58
Riparian (not USACE jurisdictional)	Direct-Permanent	4.08	0.86 / -1.60	0.92 / -1.54	0.86 / -1.60	0.92 / -1.54	0.38 / -0.01	0.24 / -0.15	0.28 / -0.83	—	0.46 / +0.34	0.46 / +0.34
	Direct-Temporary	*0.24*	*0.82 / +0.74*	*0.82 / +0.74*	*0.82 / +0.74*	*0.82 / +0.74*	—	*0.47 / +0.47*	*0.17 / +0.14*	—	*0.34 / +0.22*	*0.36 / +0.24*
	Indirect	30.94	9.09 / -8.56	9.04 / -8.61	9.09 / -8.56	9.04 / -8.61	1.02 / -0.11	1.84 / +0.70	2.59 / -1.40	—	3.67 / -4.49	3.66 / -4.50

Table 6-3
Comparison of Impacts on Aquatic Resources by Alternative

Aquatic Resource Type	Impact Type [a]	Alternative										
		BNSF Alternative Impact Acreage	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
			Impact Acreage / Difference Compared with Corresponding BNSF Area [b]									
TOTAL AQUATIC RESOURCE IMPACTS	**Direct-Permanent**	**100.95**	**16.47 / +2.20**	**15.02 / +0.75**	**13.03 / -1.24**	**11.57 / -2.70**	**15.04 / -6.13**	**14.00 / -7.17**	**23.70 / -15.01**	**4.78 / -3.28**	**5.39 / -0.18**	**6.08 / +0.52**
	Direct-Temporary	***13.01***	***1.44 / +0.85***	***1.44 / +0.85***	***1.54 / +0.96***	***1.54 / +0.96***	***0.90 / +0.02***	***5.18 / +4.31***	***2.72 / +1.20***	***1.16 / -1.46***	***3.92 / -0.22***	***3.89 / -0.25***
	Indirect-Bisected	**23.88**	**—**	**—**	**—**	**—**	**4.76 / -0.73**	**— / -5.49**	**1.73 / -15.52**	**—**	**—**	**—**
	Indirect	**361.16**	**43.41 / -5.66**	**36.47 / -12.61**	**55.01 / +5.93**	**48.06 / -1.01**	**36.27 / +9.21**	**28.47 / +1.41**	**154.68 / -31.78**	**12.34 / -7.21**	**32.87 / -14.05**	**32.28 / -14.64**

Notes:
— = No impact or not applicable
[a] Indirect impacts are calculated within a 250-foot buffer of the project footprint, which includes areas of permanent and temporary impacts.
[b] The "Difference Compared with Corresponding BNSF Area" represents the difference in impact acreages between an alternative alignment and its corresponding segment in the BNSF Alternative: positive (+) differences indicate that the alternative alignment results in greater impact acres than its corresponding segment in the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in fewer impact acres than its corresponding segment in the BNSF Alternative.
Impact calculations in this table include alignment alternatives and station alternatives, but do not include the HMF site alternatives.
All impacts were calculated based on 15% engineering design construction footprint.

For example, under the BNSF Alternative in Table 6-3, 11.59 acres of vernal pools would be affected by direct-permanent impacts, and the use of the Allensworth Bypass Alternative would result in 1.05 acres of direct-permanent impacts, a net decrease of 8.37 acres (i.e., -8.37 acres) when compared with the corresponding segment of the BNSF Alternative (BNSF–Through Allensworth).

The impact acreages presented in Table 6-4 represent the impacts of various construction elements (e.g., the HST track, the HST stations, roadway work). Table 6-4 shows the types of aquatic resources that would be directly affected by specific construction elements. Canals/ditches and lacustrine features would be affected by nearly all types of construction elements because they are common in the areas affected by the project. Seasonal wetlands, seasonal riverine/riparian, and vernal pools and vernal swales would be affected by fewer types of construction elements because they are less common in the areas affected by the project and because efforts were made as a part of project design to avoid these features where possible. Three construction elements would have no direct impact on aquatic resources: BNSF yard relocation, pedestrian bridge, and stations.

Table 6-4
Summary of Aquatic Resource Impacts by Construction Element

Construction Element	Vernal Pools/Vernal Swales	Seasonal Riverine/ Riparian	Seasonal Wetlands	Canals/ Ditches	Lacustrine
BNSF yard relocation	—	—	—	—	—
Canal relocation	—	X		X	X
Construction area	—	X	X	X	X
Drainage basin	—	—	—	X	—
Freight rail relocation	—	—	X	X	X
Heavy maintenance facility	—	—	X	X	X
HST track	X	X	X	X	X
Interlocking site	—	—	—	X	X
Natural gas relocation	—	—	X	X	X
Petroleum line relocation	—	—	—	X	X
Pedestrian bridge	—	—	—	—	—
Radio site	X	—	—	X	X
Remove base and surfacing	—	—	—	X	X
Roadway work (closures, overpass and underpass)	X	X	X	X	X
Stations	—	—	—	—	—
Temporary construction easements	—	X	—	X	X
Traction power sub-station	X	X	X	X	X
Transmission line relocation	X	X	—	X	X
Total elements affected	**5**	**7**	**7**	**15**	**14**

6.1.2.1 Direct Impacts

Direct impacts include the permanent or temporary conversion of aquatic resources. Direct impacts on aquatic resources would result from the construction activities, including the construction of the various permanent project components (e.g., embankments, rail bed, road overcrossings, aerial structure footings) and the temporary project areas required to accommodate construction operations (i.e., access and laydown areas). Most aquatic features in temporary project areas would be restored after the construction activities are completed.

Direct-permanent impacts are the impacts that would result from the use of heavy machinery to re-contour the landscape and place permanent fill materials (e.g., culverts, dirt, engineering structures) in both man-made aquatic resources (e.g., lacustrine features, canals/ditches) and natural features (e.g., season wetlands, vernal pools, vernal swales, seasonal riverine). The contouring and placement of fill in these aquatic resources would result in the permanent loss of jurisdictional waters; potentially irreversible impacts on the physical, chemical, and biological characteristics of aquatic substrates and food webs; and a potential increase in erosion and sediment transport into adjacent aquatic areas.

Direct-permanent impacts on jurisdictional waters would occur during construction of bridges and elevated structures over seasonal riverine features and wetlands as well as canals/ditches and retention/detention basins. These direct impacts would not result in the fill of aquatic features. Instead, they would result in the potential degradation of aquatic features. Table 6-5 lists the major seasonal riverine features that would be affected by the project, the alternatives in which the impacts would occur, the approximate crossing widths, and the crossing methods. All the seasonal riverine features that the project would affect run generally east to west; therefore, impacts on these features would occur under the BNSF Alternative and the other corresponding alternatives. The No Project Alternative would avoid impacts on these features, but would affect other aquatic resources. The approximate crossing widths vary by feature and by alternative, ranging from 140 feet for Deer Creek and Poso Creek to 1,625 feet for the Kings River. The crossing method for all seasonal riverine features is either by bridge or aerial structure. Direct-permanent impacts would result from the shading of aquatic resources by elevated structures (where the aerial structure is near the ground), from the placement of piles to support the aerial structures and bridges, and from the removal of vegetation during construction. These impacts would reduce the condition of affected aquatic features but would not result in the fill or removal of these features.

Direct-temporary impacts on jurisdictional waters refer to the temporary placement of fill during construction on either man-made or natural aquatic resources. Construction staging areas are required to be adjacent to or in seasonal riverine features to facilitate construction of elevated structures. Construction staging areas are also planned where bridges are proposed at at-grade crossings. Temporary fill would be placed during the construction of access roads and staging/equipment storage areas, where required. This fill would result in a temporary loss of jurisdictional waters; potential impacts on the physical, chemical, and biological characteristics of aquatic substrates and food webs; and a potential increase in erosion and sediment transport into adjacent aquatic areas.

Table 6-5
Summary of Seasonal Riverine Impacts

Water Body	Alternative(s)	Approximate Crossing Width (feet)	Crossing Method
Kings River	BNSF Alternative, Hanford West Bypass 1, Hanford West Bypass 2	300 to 1,625	Bridge or aerial structure
Cross Creek	BNSF Alternative, Hanford West Bypass 1, Hanford West Bypass 2	150 to 200	Aerial structure
Tule River	BNSF Alternative, Corcoran Elevated, Corcoran Bypass	300	Bridge or aerial structure
Deer Creek	BNSF Alternative, Allensworth Bypass	140	Aerial structure
Poso Creek	BNSF Alternative, Allensworth Bypass, and road crossing	140	Bridge or aerial structure
Kern River [1]	BNSF Alternative, Bakersfield South, Bakersfield Hybrid	1,500	Aerial structure

[1] HST alternative alignments do not cross the Kern River perpendicularly; therefore, approximate crossing width is greater than the perpendicular width of Kern River.

Direct-permanent and direct-temporary impacts on jurisdictional waters (i.e., natural and man-made features) would also include the removal or modification of local hydrology and the redirection of flow within aquatic resources. In the case of man-made features, these impacts would remove or disrupt the limited biological functions that these features provide. In natural areas, these activities would remove or disrupt the hydrology, vegetation, wildlife use, water quality conditions, and other biological functions provided by the resources. Discussion of specific impacts on major surface water features is provided in Section 3.8, Hydrology and Water Resources, in the *Fresno to Bakersfield Section: Revised Draft EIR / Supplemental Draft EIS* (Authority and FRA 2012a).

Construction material that may be placed on aquatic resources includes imported well-graded soils, sub-ballast (coarse-grained material), ballast (crushed stone), and slab (concrete). Culverts placed in aquatic resources would be constructed of pre-cast, reinforced-concrete pipe or concrete box culverts. At the locations of bridges and elevated structures, cast-in-place or precast reinforced-concrete girders or piles may be placed in aquatic resources. Other materials would be used as part of construction and operation of the HST System but are not expected to be placed in jurisdictional waters. The origin of these materials has yet to be determined, but they would be supplied by local sources from existing permitted quarries to the extent practicable. Fill material would be suitable for construction purposes and free from toxic pollutants in toxic amounts in accordance with Section 307 of the Clean Water Act.

Many of the jurisdictional waters (e.g., canals/ditches and seasonal riverine) are heavily managed by local irrigation districts to serve public water needs and agricultural production. As a result, these jurisdictional waters support few natural biological functions and values. The biological functions of these man-made features include limited habitat for wildlife and a capacity for water storage and/or release. A number of these jurisdictional waters have been previously degraded or affected by various existing roads and the existing BNSF Railway infrastructure. The construction of the HST alternatives would eliminate or further degrade these man-made jurisdictional waters.

6.1.2.2 Indirect Impacts

Indirect impacts on aquatic resources could occur outside of the construction and project footprints and could be separated from the direct impacts in time and space. Potential indirect impacts on jurisdictional waters include a number of water-quality-related impacts: erosion, siltation, and runoff into natural and man-made or manipulated water features downstream of the footprint. Indirect impacts could occur on aquatic features as a result of both construction and operation of the HST System. The acreages of indirect impacts on jurisdictional waters reported in this document represent the combined sum of indirect impact acreages for both construction and operation impacts. The long-term indirect impacts on jurisdictional waters are more extensive than—and tend to encompass—the short-term construction impacts.

Construction of an at-grade embankment could result in changes in hydrology that have long-term indirect impacts on the surrounding aquatic resources. For many of the man-made or manipulated features, indirect impacts would be minor, and hydrologic changes would be minimal. However, for natural features such as seasonal wetlands and vernal pools and swales, the impacts may result in significant changes in the natural hydrological regime. In some areas, the hydroperiod may be either reduced or extended where sheet flow is limited.

Because vernal pools and vernal swales are sensitive to disturbance, where they straddle the project footprints, they could be permanently, albeit indirectly, disturbed, if the underlying layer is disturbed or hydrological sheet flow or rain collection is altered significantly. As described in Section 3.3, Methodology: Impact Calculations, these indirect impacts are categorized and calculated separately to account for these significant and potentially more substantive indirect impacts.

Seasonal riverine features would be spanned on an elevated structure or bridged, so the indirect impacts on seasonal riverine and riparian areas would include the removal of the riparian trees and reduced contribution to and ability to recycle nutrients. Although changes in shading and water temperature may occur, because a bridge or elevated structure would provide more shade than currently provided by the riparian trees, the water temperature would likely be lower. These indirect impacts would affect adjacent aquatic resources up to 250 feet from the project-related disturbances.

6.2 Existing Conditions

The existing conditions of the aquatic resources in the study area were determined through the use of the CRAM and relative condition extrapolation based on feature type and aerial photographic interpretation. This section presents the CRAM scores from the condition assessment as well as an assessment of the direct and indirect impacts to aquatic resources based on relative condition across HST alternatives.

6.2.1 CRAM Results

A total of 42 assessment areas (AAs) were assessed within the Fresno to Bakersfield Section using CRAM. A summary of the CRAM scores for each CRAM wetland type is presented in Table 6-6. Figure 6-1 shows the locations of the CRAM AAs in the Fresno to Bakersfield Section. A complete summary of the CRAM results is provided in Appendix A. The CRAM scores of AAs within the Fresno to Bakersfield Section ranged from 27.8 to 82.7.

Table 6-6
Range of Index and Attribute Scores by CRAM Type and Wetland Type

CRAM Type	Number of AAs	Range of Index Score	Range in Attribute Scores			
			Buffer and Landscape Context	Hydrology	Physical Structure	Biotic Structure
Depressional Wetland	8	31.5–66.2	33–66.7	28.8–45.4	25–75	25–77.8
Retention/Detention Basin and Agriculture Reservoirs	6	31.5–51.6	33–58.3	28.8–37.5	25–62.5	25–69.4
Seasonal Wetland	2	55.1–66.2	66.7–66.7	45.4–45.4	50–75	58.3–77.8
Riverine Wetland	17	27.8–72.9	25–83	25–93	25–75	30.6–72.2
Canal/Ditch	10	27.8–68.3	25–83	25–93	25–62.5	30.6–67
Seasonal Riverine	7	60.5–72.9	50–75	59–77.5	50–75	53–72.2
Individual Vernal Pool	11	56.7–80.9	75–100	55.8–93.3	37.5–75	25–83.3
Vernal Pool System	6	76.7–82.7	75–100	77.8–93.3	66.7–83.3	58.3–70.8

AA assessment area
CRAM California Rapid Assessment Method

6.2.1.1 Depressional Sites

Depressional sites identified in the study area were fundamentally of two types. The first type was agricultural irrigation reservoirs (retention/detention basins). These features yielded very low CRAM scores, reflecting that these sites are created features that function in conjunction with canals and ditches in rather unnatural "watersheds." These reservoirs are largely temporary groundwater storage facilities that function hydrologically as the sources of water (and often as the sources of hydrostatic pressure) for the agricultural irrigation systems of which they are elements. They are highly dynamic, with evidence in some reservoirs of significant fluctuations in water surface elevation over short periods, and have little vegetation. Fundamentally, they are not part of the remnant watersheds in the study area except to the extent that they provide water that may flow in the canal/ditch systems that still retain remnant "watershed" characteristics (e.g., drainage networks that convey rainfall to a watershed low point, generally the Tulare Lake bed) in the study area. Little variation in condition was observed among these features anywhere in the Fresno to Bakersfield Section.

The second type of depressional wetland area identified in the project region was detention/retention basins that function as part of local storm-water management systems. Such features were largely restricted to developed parts of the project alignment. These depressions are typically better vegetated but less hydrologically connected than are the agricultural reservoirs (that is, the primary goal of such features is *not* to release water to regional drainage systems), but they also had low CRAM scores that reflect their low importance to study area watersheds.

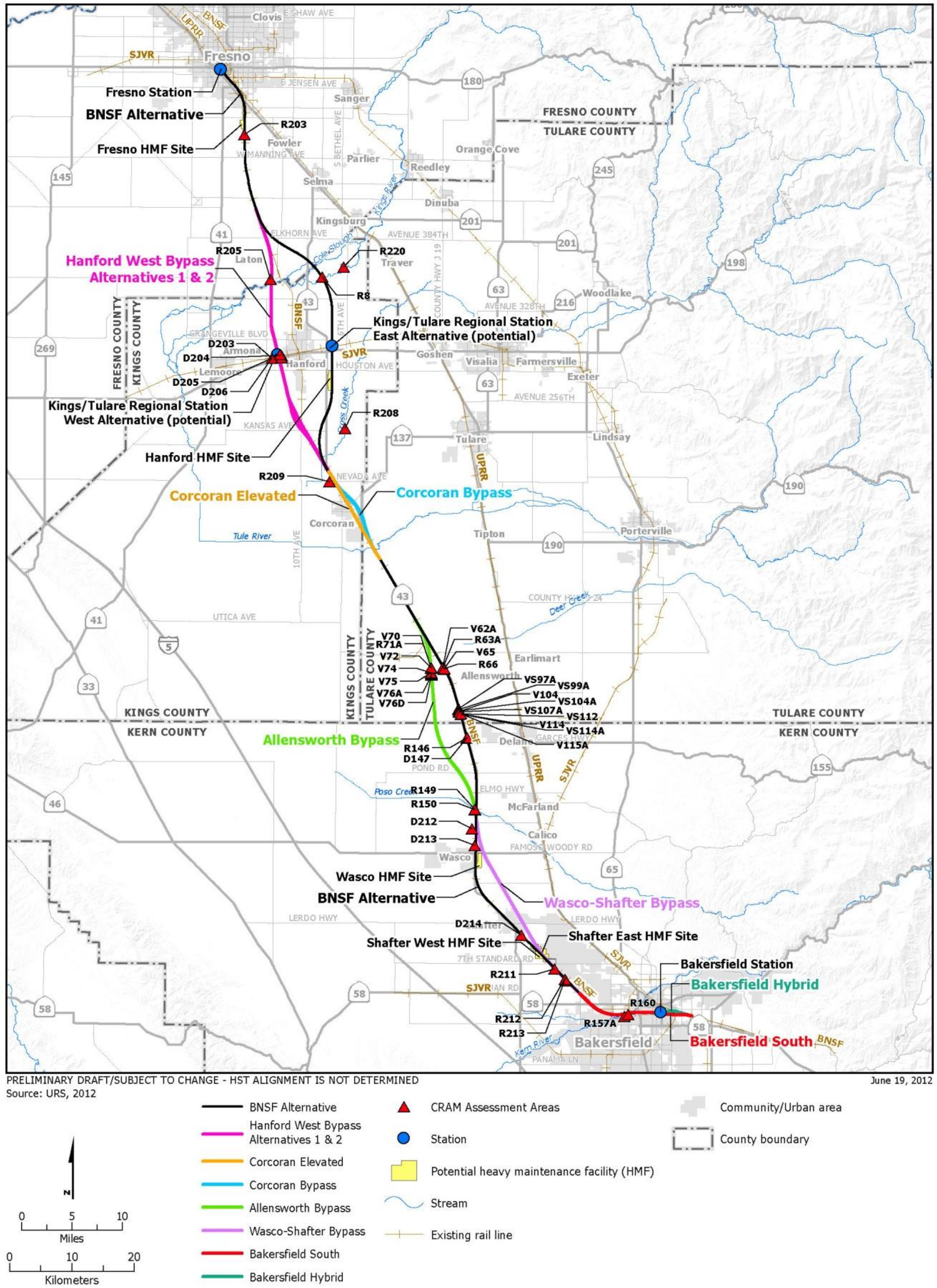


Figure 6-1
CRAM Evaluation along the Fresno to Bakersfield alternatives

These two types of depressional wetlands are indicative of study area watersheds that have substantially altered land uses and hydrology. The low CRAM scores indicate that these watershed elements do not have a high condition status and provide few of the functions that would be expected from depressional wetlands in less-altered watersheds.

Natural depressional wetlands in the Fresno to Bakersfield Section are rare, apparently occurring primarily as a consequence of past fragmentation and the isolation of more natural aquatic features, though some of the shallow natural wetlands in the Allensworth region may be depressional wetlands and are not uncommon in that context. As indicated by the CRAM scores of two "natural" depressional wetlands near Hanford (apparently relicts of a former riverine feature, probably a distributary of the Kings River), such remnants tend to provide better condition indicators, as exhibited by CRAM scores that are significantly higher than those of the created features.

6.2.1.2 Riverine Sites

The conditions presented by canals and ditches are assessed in CRAM using the riverine module, which allows a comparison of the conditions in such features with respect to remnant natural riverine features in the study area. The canals and ditches assessed throughout the Fresno to Bakersfield Section (with two exceptions; see below) yielded scores that were substantially (approximately 20 CRAM points) lower than the scores for remnant natural riverine systems in the project vicinity (the channels of the Kern River, Poso Creek, Cross Creek, and the Kings River). The CRAM scores for the canals and ditches assessed in the study area indicate that these surface water features also do not provide many of the desired conditions found in natural riverine systems for the study area watersheds.

Functionally, the canals and ditches form an alternative hydrological network in lieu of the more natural drainage system that existed before the commitment of virtually all of the study area to agriculture. In a large sense, the conversion has included even the remnant natural water features. All of the natural channels assessed in this study were clearly used as conveyances for artificial (mostly irrigation) water flow in addition to their more natural functions, such as conveying runoff. At the same time, many of the larger canals in the study area showed indications that they function to convey storm water and to deliver irrigation flows.

The low condition scores for canals and ditches arise largely because of the artificiality of the constructed features in a context of highly modified watersheds. Two canals/ditches in Colonel Allensworth State Historic Park exhibited substantially higher CRAM scores than did the majority of artificial features in the Fresno to Bakersfield Section because of the less-altered hydrological conditions in the state historic park. These sites indicate that canals/ditches elsewhere in the study area provide low condition scores because of the regional alteration of watershed patterns, not simply because they are canals and ditches.

Although the condition scores for the remnant natural features in the project alignment are higher than those of most canals and ditches, even the scores of the natural riverine features are not high in comparison with scores from riverine features in less-altered parts of California (based on CRAM scores reviewed at www.cramwetlands.org; see Section 6.4 of Appendix A for a description of the internal standard in CRAM modules that enables inter-regional comparisons among wetlands in each type). The scores indicate that even the least-altered riverine features in the study area provide fewer benefits to aquatic systems than do riverine features in less-disturbed parts of California.

6.2.1.3 Vernal Pool Sites

The CRAM scores for vernal pool wetlands are the highest scores for aquatic features within the Fresno to Bakersfield Section. This result is fully consistent with the occurrence of these wetlands

in the least-fragmented remnant watersheds in the study area. The scores suggest that the watersheds in the Allensworth region continue to provide higher levels of various functions than do most of the altered watersheds elsewhere in the study area. The CRAM assessment did not locate aquatic features identifiable as vernal pools in parts of the project alignments that were not in the Allensworth region (nevertheless, vernal pool features that were not identified as vernal pools may exist elsewhere). The CRAM assessment generally concluded that it is unreasonable to assume that vernal pools were not historically widespread in the Tulare Lake Basin and that the scarcity of such features today is a consequence of their elimination as part of the conversion of the regional landscape to agriculture.

The identified condition scores for vernal pool systems are uniformly higher than comparable scores for individual vernal pools. Those who conducted the CRAM assessment are uncertain why this pattern exists, given that individual pools were intermixed with vernal pool systems where vernal pools occurred.

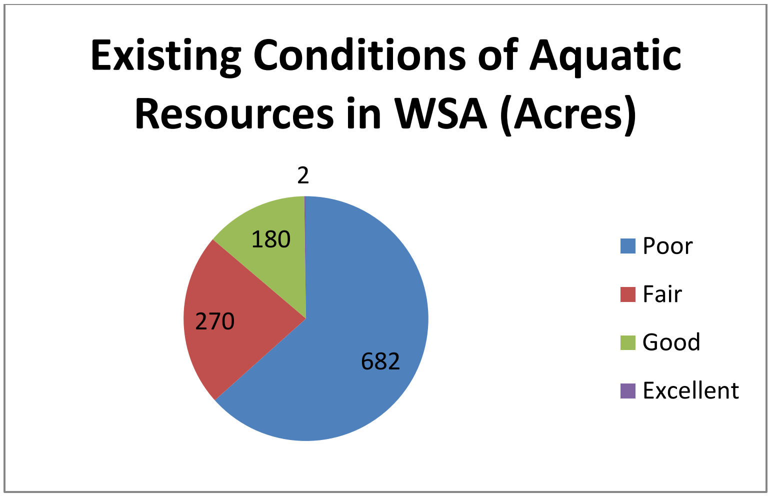
The vernal pools in the Fresno to Bakersfield Section study area are largely lacking in structural patch richness and vernal pool endemic plant species, two metrics that play large roles in calculating the attribute scores for physical structure and biotic structure. Although these metrics capture the conditions of vernal pools in California, they do not seem to account for the unique functions of vernal pools in the study area, which are representative of vernal pools in this region of the Central Valley. Low scores for physical and biotic structure may be indicative of the limitations of CRAM for assessing unique wetland communities.

6.2.2 Relative Condition Impact Assessment

To provide a side-by-side comparison of the direct and indirect impacts on aquatic resources, the relative condition assessment was used to estimate the condition of the aquatic resources that may be affected by the proposed project.

Through the CRAM results and the methods described in Section 3.2, Methodology: Existing Conditions, a relative condition was assigned to all aquatic resources in the study area. The condition of aquatic resources was established using a two-step process. First, the conditions of a representative sample of aquatic features were assessed using the CRAM. Second, the results from the CRAM assessment were extrapolated to provide relative condition values for all aquatic resources in the study area. Aerial photographic interpretation and other factors, including feature type, watershed, and proximity to stressors, were also considered in extrapolating condition scores.

Relative conditions are largely determined by CRAM score, landscape position, and whether the feature has been manipulated (man-made) or occurs in a remnant, un-fragmented landscape. The relative condition of all aquatic resources in the study area (250-foot buffer from footprint) indicated that nearly two-thirds of the aquatic resources in the study are in poor condition, with the remaining third largely split between fair and good conditions, and less than <1% of the aquatic features in excellent condition.



The extrapolation of aquatic resource conditions indicated that wetland feature types do not directly correspond to a single relative condition. As one would expect, based on CRAM results, wetland types exhibit a range of conditions. However, in general, the relative conditions of aquatic resources largely match the anticipated relative condition scores. More clearly, the manipulated or constructed aquatic features are typically in poor condition, with a few features that score higher as fair (or in some rare instances, good). Similarly, the majority of the vernal pool features are in good condition, with relatively few features in fair or excellent condition. Table 6-7 provides a summary of the aquatic resource types, without consideration of watershed or alternative, and the number of features associated with a given relative condition.

Table 6-7

Summary of Aquatic Resource Impacts by Aquatic Type and Relative Condition in the Study Area

Aquatic Resource Type	Relative Condition	Number of Aquatic Features	Notes
Emergent wetland	Poor	1	-—
	Fair	1	Located in Hanford, flow from Guernsey Slough.
	Good	1	Located in Hanford, surrounded by riparian vegetation, supports waterfowl.
Seasonal wetland	Poor	11	Linear features BNSF right-of-way
	Fair	61	—
Vernal pools and swales	Poor	2	1 feature in BNSF right-of-way, 1 feature filled with dumped refuse west of Allensworth
	Fair	97	—
	Good	131	—
	Excellent	5	—

Table 6-7
Summary of Aquatic Resource Impacts by Aquatic Type and Relative Condition in the Study Area

Aquatic Resource Type	Relative Condition	Number of Aquatic Features	Notes
Canals/ditches	Poor	235	—
	Fair	3	Two ditches surrounded by seasonal wetland, one ditch adjacent to vernal pool
	Good	1	Located in Colonel Allensworth State Historic Park, not agricultural ditch
Lacustrine	Poor	179	—
	Fair	5	Four reservoirs, one retention/detention basin surrounded by riparian vegetation
Seasonal riverine[A]	Poor	2	Two sections of Cross Creek
	Fair	11	—
	Good	6	—

Notes:
— = No special note.
[A] The CRAM assessment of seasonal riverine included adjacent riparian areas as part of the AA. Riparian areas are not waters of the U.S. The condition of the riparian areas was assigned based on the condition assigned within the CRAM AA and is the same as the associated seasonal riverine area.

6.2.2.1 Watershed Evaluation

Because the HST alternatives occur in more than one watershed, a comparison of relative condition impacts across multiple watersheds and alternatives is not productive in analysis of the least environmentally damaging practicable alternative. However, a watershed-level evaluation can help identify which watersheds have good and excellent quality habitats that may be affected by the project (as discussed in Section 6.1.1, above). For the purpose of understanding the conditions of the aquatic resources that may be affected by watershed, the range of impacts to aquatic resources in poor, fair, good, and excellent condition are provided to aid in this evaluation (Table 6-8). As described in Section 5.3, Watershed Profile Discussion, watershed conditions across the Tulare Lake Basin and especially the conditions present in the Great Valley are largely similar. Table 6-8 provides the range of potential impacts to the conditions of aquatic resources in each watershed.

Implementation of the Fresno to Bakersfield Section would have no direct or indirect impacts on good quality aquatic resources in the Upper Kaweah, Upper Poso, and, for all practical purposes, the Upper Tule watersheds. Regardless of the alternative ultimately selected, few (to no) direct or indirect impacts to good quality aquatic resources in the Upper Dry Watershed would occur. Impacts to good quality aquatic features would occur in the Tulare–Buena Vista Lakes, Upper Deer–Upper White, and Middle Kern–Upper Tehachapi–Grapevine watersheds. The direct impacts in these watersheds range from a small (the Tulare–Buena Vista Lakes and the Middle Kern–Upper Tehachapi–Grapevine watersheds) to a large (the Upper Deer–Upper White Watershed) loss of good quality aquatic features.

The range of impacts to watersheds arises based on the difference in impacts associated with the HST alternatives. The biggest difference in potential direct impact occurs in the Upper Deer–Upper White Watershed: the difference is approximately 10.89 acres. The range of potential direct impacts associated with the Middle Kern–Upper Tehachapi–Grapevine Watershed is small: less than 0.18 acres difference. The range of potential impacts associated with Tulare–Buena Vista Lakes Watershed is less dramatic than that of the Upper Deer–Upper White Watershed and, depending on HST alternative, may result in a 2.78-acre difference.

The range of potential indirect impacts to good quality aquatic features is greater than 10 acres depending on HST alternative; however, the potential indirect impacts under one alternative may increase potential direct impacts for the same alternative.

More detailed condition impact analyses are provided in Section 7.1, Net Watershed Condition. By removing the watershed layer, a more meaningful comparison of the relative condition impacts by alternative is possible; the removal of this layer allows for both a quantitative comparison (see Section 6.1, Impacts on Aquatic Resources) and a qualitative comparison (Section 6.2.2.2, Alternative Evaluation, below).

Table 6-8
Range of Direct and Indirect Impacts to Relative Condition of Aquatic Resources by Watershed

Watershed	Impact Type	Aquatic Resource Relative Condition			
		Poor	Fair	Good	Excellent
		Range of Impact Acreage (Acres)			
Upper Dry	Direct	5.20–5.28	0.67–1.85	0.00–0.16	—
	Indirect	16.00–16.35	1.12–3.40	0.00–1.15	—
Tulare–Buena Vista Lakes	Direct	31.79–39.29	1.90–2.04	0.53–3.31	—
	Indirect	60.05–72.56	12.34–20.49	8.16–26.50	—
Upper Kaweah	Direct	6.31–14.45	0.00–1.09	—	—
	Indirect	10.38–20.25	1.67–10.5	—	—
Upper Tule	Direct	1.92–4.71	0.67–2.61	—	—
	Indirect	0.44–2.78	3.42–4.56	0.01–0.01	—
Upper Deer–Upper White	Direct	12.84–17.10	9.83–11.75	0.17–11.08	0.00–0.03
	Indirect	70.71–75.18	57.55–82.07	8.66–23.59	0.00–1.50
Upper Poso	Direct	1.42–5.66	0.43–0.99	—	—
	Indirect	3.25–9.47	2.36–4.19	—	—
Middle Kern–Upper Tehachapi–Grapevine	Direct	4.17–4.82	0.00–0.02	2.28–2.46	—
	Indirect	15.39–17.72	0.00–0.84	16.06–27.30	—

6.2.2.2 Alternative Evaluation

The relative condition assessment allows for a comparison between the direct and indirect effects anticipated (as presented in Section 6.1, Impacts on Aquatic Resources) and the potential impacts based on relative condition by alternative. Table 6-9 only includes the potential impact on aquatic resources by a given alternative and does not include or consider the associated

watershed or separation by jurisdictional status (waters of the U.S. or CDFG Code 1600 et. seq.). Because the analysis includes riparian area, the actual impact to waters of the U.S, when considering condition alone, is in most cases less than what is presented in Table 6-9. The impacts by condition solely to riparian areas will be presented and evaluated in the *Fresno to Bakersfield Section: Checkpoint C Summary Report* (Authority and FRA 2012e).

This alternative evaluation is important to understand where a quantitatively small impact would affect an excellent or good quality resource versus an alternative that may have slightly higher quantitative impacts but affect a poor quality aquatic resource. Table 6-9 summarizes the direct and indirect impacts associated with each of the Fresno to Bakersfield Section alternatives by condition. In contrast with Table 6-3, this assessment does not include aquatic resource types or jurisdictional status; both Tables 6-8 and 6-9 (and Charts 6-1 through 6-8) only evaluate relative condition (regardless of aquatic resource type).

In general, the focus on impacts is placed on the impacts to aquatic resources that are in excellent or good condition, secondarily on features in fair condition, and lastly on features in poor condition. Similarly, impacts that are direct-permanent are more severe than those that are direct-temporary and those that are indirect-bisected or indirect.

Like Table 6-3, Table 6-9 also uses delta comparison to allow for a quick comparison of the HST alternative alignments. The delta comparison uses the BNSF Alternative, in which the acreage reflects the total impact that would occur along the only end-to-end alternative. To compare the other project alternatives and design options, the table contains two numbers for each of the subsequent alternatives: the first number is the amount of impact anticipated for the given alternative, and the second number is the change (or delta) when compared against the corresponding segment of the BNSF Alternative. Comparison tables differentiate impact acreages between an alternative alignment and its corresponding segment of the BNSF Alternative: positive (+) differences indicate that the alternative alignment results in a larger number of impact acres than its corresponding segment of the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in a smaller number of impact acres than its corresponding segment of the BNSF Alternative.

For example, under the BNSF Alternative, 15.77 acres of good condition aquatic features (waters of the U.S. and riparian areas) would be affected by direct-permanent impacts. Use of the Allensworth Bypass would result in 0.17 acres of direct-permanent impacts, a net decrease of 10.92 acres (i.e., -10.92 acres) when compared with the corresponding area of the BNSF Alternative (BNSF–Through Allensworth).

Table 6-9
Summary of Aquatic Resource Impacts by Aquatic Feature and Relative Condition

Relative Condition	Type of Aquatic Features [a]	BNSF Impact Acreage	Impact Acreage / Difference Compared with Corresponding BNSF Area [b]									
			Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
Direct-Permanent Impacts												
Poor	Seasonal wetland, Vernal Pools and Swales, Canals/Ditches, Lacustrine, Seasonal riverine	70.38	15.11 / +4.80	13.78 / +3.47	11.68 / +1.37	10.35 / +0.04	13.29 / -5.70	12.01 / -6.99	11.64 / -5.34	4.78 / -3.28	4.10 / -0.01	4.79 / +0.68
Fair	Seasonal wetland, Vernal Pools and Swales, Lacustrine, Seasonal riverine, Riparian	14.77	0.96 / +0.23	0.83 / +0.11	0.94 / +0.22	0.81 / +0.09	1.76 / -0.43	2.00 / -0.19	11.89 / +1.27	—	—	—
Good	Vernal Pools and Swales, Canals/Ditches, Seasonal riverine, Riparian	15.77	0.41 / -2.83	0.41 / -2.83	0.41 / -2.83	0.41 / -2.83	—	—	0.17 / -10.92	—	1.29 / -0.17	1.29 / -0.17
Excellent	Vernal Pools and Swales	0.03	—	—	—	—	—	—	— / -0.03	—	—	—
Direct-Temporary Impacts												
Poor	Seasonal wetland, Canals/Ditches, Lacustrine	11.05	0.11 / -0.39	0.11 / -0.39	0.21 / -0.29	0.21 / -0.29	0.90 / +0.02	4.57 / +3.69	2.45 / +1.11	1.16 / -1.46	2.93 / -0.18	2.89 / -0.23
Fair	Seasonal wetland, Seasonal riverine, Riparian	0.87	1.05 / +1.05	1.05 / +1.05	1.05 / +1.05	1.05 / +1.05	—	0.61 / +0.61	0.27 / +0.08	—	— / -0.02	— / -0.02
Good	Seasonal riverine, Riparian	1.09	0.28 / +0.20	0.28 / +0.20	0.28 / +0.20	0.28 / +0.20	—	—	—	—	0.99 / -0.02	1.01 / -<0.01
Excellent	N/A	—	—	—	—	—	—	—	—	—	—	—
Indirect-Bisected Impacts												
Poor	N/A	—	—	—	—	—	—	—	—	—	—	—
Fair	Vernal Pools and Swales	11.24	—	—	—	—	4.76 / -0.73	— / -5.49	0.32 / -4.29	—	—	—
Good	Vernal Pools and Swales	12.35	—	—	—	—	—	—	1.41 / -10.93	—	—	—
Excellent	Vernal Pools and Swales	0.30	—	—	—	—	—	—	— / -0.30	—	—	—
Indirect Impacts [c]												
Poor	Emergent wetland, Seasonal wetland, Vernal Pools and Swales, Canals/Ditches, Lacustrine, Seasonal riverine, Riparian	193.41	28.93 / +10.36	22.81 / +4.25	29.50 / +10.93	23.38 / +4.82	30.38 / +8.22	22.07 / -0.09	88.39 / -4.52	12.34 / -7.21	16.79 / -1.98	16.22 / -2.56
Fair	Emergent wetland, Seasonal wetland, Vernal Pools and Swales, Canals/Ditches, Lacustrine, Seasonal riverine, Riparian	101.49	5.17 / +1.17	4.34 / +0.34	16.19 / +12.19	15.37 / +11.36	5.88 / +0.99	6.38 / +1.50	59.04 / -22.07	—	<0.01 / -0.84	<0.01 / -0.84

Table 6-9
Summary of Aquatic Resource Impacts by Aquatic Feature and Relative Condition

Relative Condition	Type of Aquatic Features [a]	BNSF Impact Acreage	Impact Acreage / Difference Compared with Corresponding BNSF Area [b]									
			Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
Good	Emergent wetland, Vernal Pools and Swales, Canals/Ditches, Seasonal riverine, Riparian	65.06	9.31 / -17.19	9.31 / -17.19	9.31 / -17.19	9.31 / -17.19	0.01 / 0.00	0.01 / 0.00	7.25 / -3.99	—	16.07 / -11.23	16.06 / -11.24
Excellent	Vernal Pools and Swales	1.20	—	—	—	—	—	—	— / -1.20	—	—	—
Totals												
Total poor		274.84	44.15 / +14.77	36.71 / +7.32	41.40 / +12.01	33.95 / +4.57	44.56 / +2.54	38.64 / -3.38	102.47 / -8.74	18.28 / -11.94	23.83 / -2.18	23.90 / -2.11
Total fair		128.37	7.17 / +2.45	6.22 / +1.49	18.18 / +13.46	17.23 / +12.50	12.39 / -0.17	8.99 / -3.57	71.53 / -25.01	—	— / -0.86	— / -0.86
Total good		94.26	10.00 / -19.82	10.00 / -19.82	10.00 / -19.82	10.00 / -19.82	0.01 / 0.00	0.01 / 0.00	8.83 / -25.84	—	18.35 / -11.41	18.35 / -11.41
Total excellent		1.53	—	—	—	—	—	—	— / -1.53	—	—	—

Notes:

— = No impact or not applicable

[a] Impacts include both waters of the U.S. and Riparian Areas. This leads to an overestimation of the total impacts by condition to waters of the U.S. (wetlands and other waters of the U.S).

[b] The "Difference Compared with Corresponding BNSF Area" represents the difference in impact acreages between an alternative alignment and its corresponding segment in the BNSF Alternative: positive (+) differences indicate that the alternative alignment results in a larger number of impact acres than its corresponding segment in the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in a smaller number of impact acres than its corresponding segment in the BNSF Alternative.

[c] Indirect impacts are calculated within a 250-foot buffer of the project footprint, which includes areas of permanent and temporary impacts. Impact calculations in this table include alignment alternatives and station alternatives, but do not include the HMF site alternatives.

All impacts were calculated based on the 15% engineering design construction footprint.

Another way to look at the differences in impacts between existing conditions by alternative is in graph form. Chart 6-1 shows the total acreage of direct and indirect impacts for each alternative, including the corresponding segment of the BNSF Alternative, color-coded by existing condition. The chart includes HST segments that are common to all alternatives (Fresno, Pixley, and Monmouth). The BNSF Alternative is presented through the use of segments that compose the BNSF (Fresno, Hanford, Through Corcoran, Pixley, Through Allensworth, Through Wasco-Shafter, Monmouth, and Bakersfield North).

Total impacts (including direct and indirect impacts) by acreage and existing conditions are largely similar for the alternative alignments within the same geographic area; however, differences in impact acreage and existing conditions are present. Excellent condition features only exist in small quantities, in the Allensworth area (in the Upper Deer–Upper White Watershed). The Allensworth area also has more acreage of aquatic features, including those in good condition (vernal pools and swales, Deer Creek, and Poso Creek), than any of the other geographic areas. The Bakersfield and Hanford areas also contain aquatic resources in good condition—primarily those associated with King River Complex, seasonal wetlands, and the Kern River. All of the impacted features in the Wasco-Shafter area are in poor existing condition.

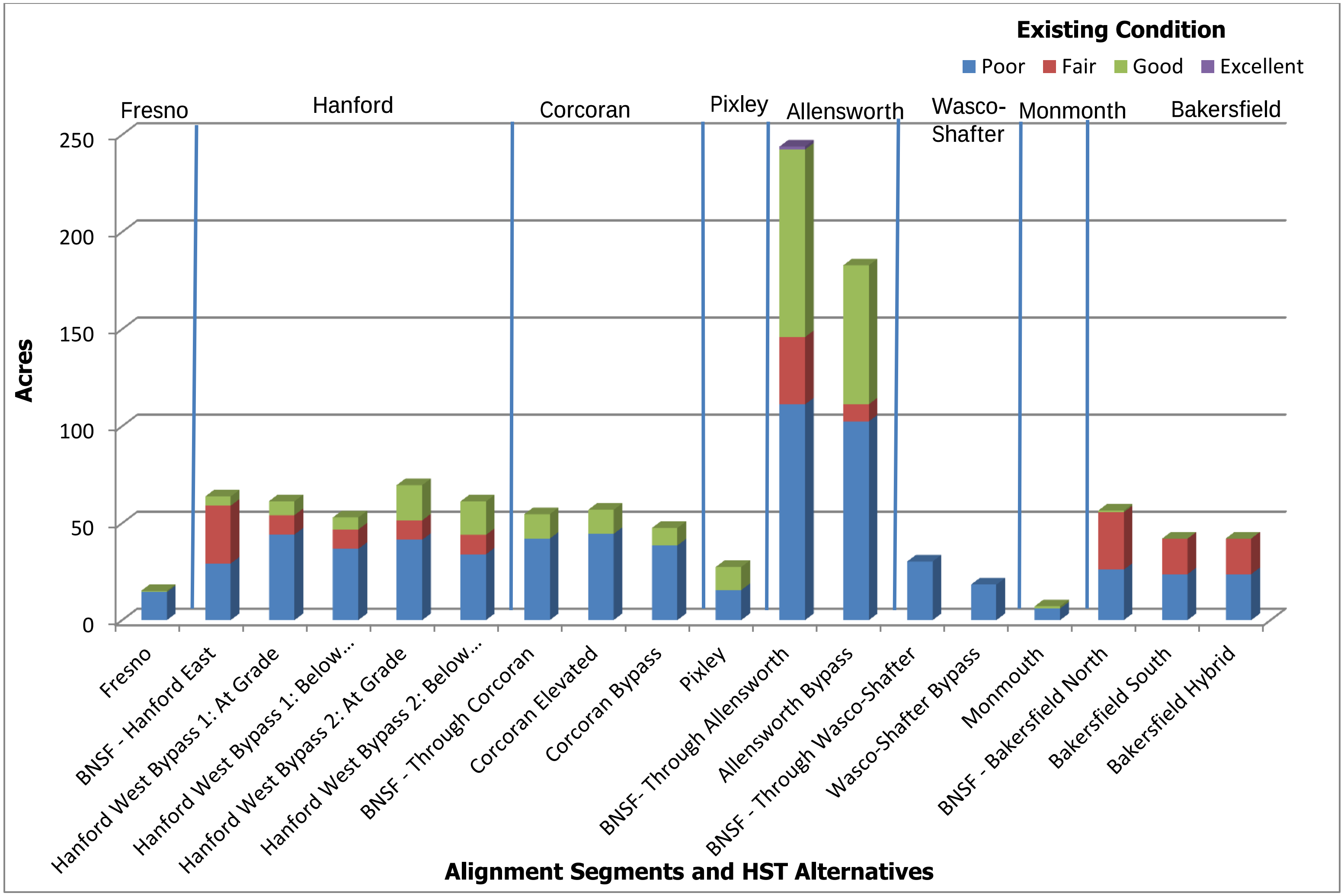


Chart 6-1
Existing Condition of Aquatic Features by Alternative

6.2.3 Stressors

In addition to calculating an overall condition score and attribute scores, CRAM includes a stressor checklist. A stressor is defined in the CRAM User's Manual as "an anthropogenic perturbation within a wetland or its setting that is likely to negatively impact the functional capacity of a CRAM Assessment Area" (CWMW 2012). The stressor checklist is used to account for low CRAM scores by identifying specific impacts on the landscape, hydrology, physical, or biotic structure of an aquatic feature. In some cases, a single stressor may be the primary cause of low-scoring conditions, though conditions are usually caused by interactions among multiple stressors (EPA 2002). The same stressors also influence and affect relative condition classification.

A number of stressors were identified during CRAM field work. Table 6-10 summarizes the stressors identified by each CRAM wetland type. No strong correlation of CRAM scores and the number of stressors was found among the aquatic features assessed in the Fresno to Bakersfield Section. A weak correlation (-0.15) supports the assumption that features with lower CRAM scores are subjected to more stressors, though many low-scoring features had few stressors.

The CRAM assessment concluded that the low-scoring man-made and manipulated features (canals/ditches, lacustrine) are a direct result of anthropogenic influences (i.e., these features are the stressors for natural watershed conditions in the project area). However, when CRAM scores and the numbers of stressors are compared for "natural" features only, the correlation remains weak. The CRAM assessment concluded that the effects of stressors throughout the project area have overwhelmed the potential relationships among stressors and natural aquatic systems, as a consequence of the regional conversion of the land use pattern to one completely dominated by agriculture, urban development, and transportation corridors with few remnants of natural hydrological/wetland systems. The most common stressors (presence of dike/levee, transportation corridor, adjacent to an orchard/nursery) are present throughout the Fresno to Bakersfield Section and affect all types of aquatic features to the extent that statistical relationships among stressors and condition scores are not observable.

Table 6-10
Most Common Stressors Affecting CRAM Wetland Types

CRAM Wetland Type	Attribute	Stressor
Depressional	Buffer and landscape context	Orchards/nurseries, row crop agriculture, industrial and commercial, and transportation corridor
	Hydrology	Actively managed hydrology
	Physical structure	Trash/refuse
	Biotic structure	Pesticide application/vector control, and human visitation
Riverine	Buffer and landscape context	Orchards/nurseries, Transportation corridor, dryland farming and row crop agriculture
	Hydrology	Dikes/levees, actively managed hydrology, and non-point source discharges
	Physical structure	Vegetation management, trash, refuse, excessive sediment from watershed, plowing discing, and grading and compaction.
	Biotic structure	Pesticide application/vector control, excessive human visitation, and treatment of non-native vegetation

Table 6-10
Most Common Stressors Affecting CRAM Wetland Types

CRAM Wetland Type	Attribute	Stressor
Vernal pools	Buffer and landscape context	Transportation corridor, dryland farming, and orchards/nurseries
	Hydrology	Dikes/levees, and flow obstructions
	Physical structure	Grading/compaction, and trash/refuse
	Biotic structure	Few stressors identified

CRAM = California Rapid Assessment Method

6.3 Post-Project Condition

A post-project condition assessment for the various aquatic features in the Fresno to Bakersfield alternatives was conducted using construction and project footprint information coupled with a set of projections made for each design feature, as described in Section 3.4, Methodology: Post-Project Conditions. This section provides a comparison of the post-project conditions by alternative. This analysis is useful to understand the potential changes that would result from the construction and operation of the Fresno to Bakersfield Section.

The post-project condition includes five potential condition categories: does not exist, fair, poor, good and excellent. The acreages associated with each classification are based on the total acreage affected by the four types of the potential project impacts: direct-permanent, direct-temporary, indirect-bisected, and indirect.

Aquatic resources assigned a post-project condition of "does not exist" are expected to experience fill and would be lost through construction and implementation of the project. These adverse and significant impacts would occur as a result of direct-permanent impacts and as a result of direct-temporary impacts associated with the loss of sensitive features, such as vernal pools and swales (as described in Section 3.3, Methodology: Impact Calculations, all direct-temporary impacts to vernal pools and swales are considered direct-permanent impacts). Some features that are associated with direct-permanent impacts would experience a reduction in relative condition as a result of construction elements that would allow the resource or feature to remain. For example, the construction of an elevated structure or bridge structure over seasonal riverine features (as is the case throughout the project area) would only cause a reduced condition.

The other post-project condition classifications (poor, fair, good, and excellent) would result from a combination of potential construction and operations impacts, including direct-temporary, indirect-bisected, and indirect. Aquatic features in areas of direct-temporary impacts would be temporarily lost during construction and may experience fill. However, following the completion of construction, these features would be restored. In some instances (i.e., for man-made and manipulated features), aquatic features would be restored to the pre-project or existing condition. In other situations (i.e., for natural features), these features would be restored but their overall condition would be reduced. Because vernal pools and swales that experience indirect-bisected impacts are expected to experience significant impacts, these features are expected to be in poor condition after construction. The post-project condition of features in areas of indirect impact would vary depending on the resource considered: for man-made or

manipulated features, indirect impacts are not expected to result in a change in condition, whereas for natural features, indirect impacts may result in a reduction in condition.

The focus of the post-project evaluation in this section is the conversion of features from good or excellent condition class to lesser condition classes. In this sense, the evaluation is weighted, with the most important part of the post-project condition assessment being those features that converted to the "does not exist" condition. Secondary focus and analysis are placed on the conversion of good or excellent aquatic features to a lesser condition class.

6.3.1 Comparison by HST Alternative

This section discusses the post-project condition of aquatic resources associated with each of the potential alternatives within a given geographic area. The post-project condition is presented first for the common components and then for potential alternatives within distinct geographic areas. In each section, a chart is provided to show the acreage of aquatic features within each post-project condition category for the various alternatives. The charts also use coloring to show the existing condition, which allows one to determine whether the condition of the aquatic features has changed as a result of the project. Table 6-2 lists the various BNSF Alternative segments, the corresponding alternatives, and the common components.

6.3.1.1 BNSF Alternative

As the only end-to-end alternative from Fresno to Bakersfield, the existing relative condition scores of aquatic features within the BNSF Alternative range from poor to excellent, with most features being in poor condition and few features in good or excellent condition. As depicted in Chart 6-2, after project construction, some of the features in good condition would be lost and their post-project condition would be "does not exist." The majority of the good and excellent features would be reduced to fair or poor condition under this alternative. This chart does not provide a comparison with other HST alternatives; instead, it shows the amplitude of potential project impacts with which the least environmentally damaging practicable alternative may subsequently be compared.

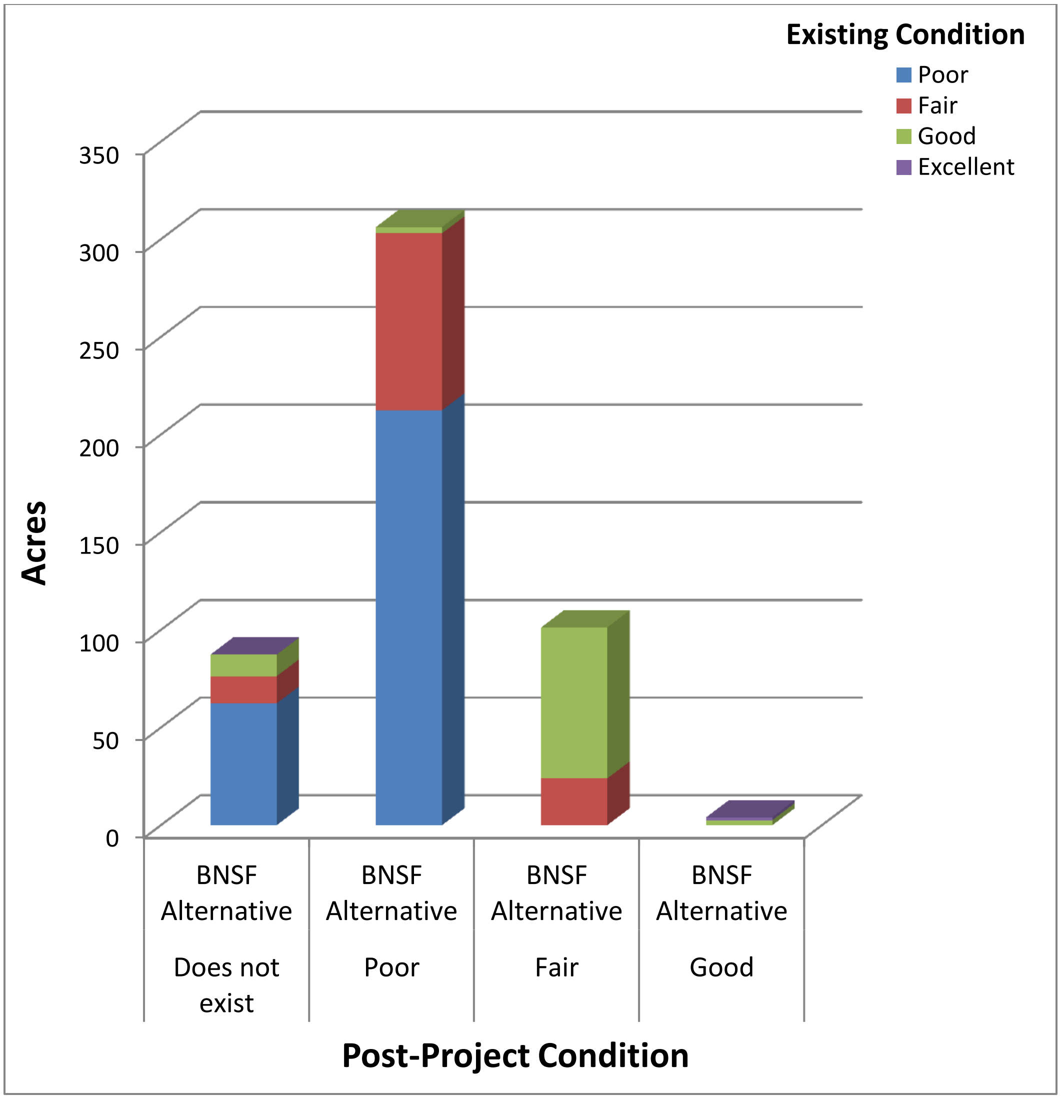


Chart 6-2
Post-Project Condition of BNSF Alternative

All aquatic resource types are represented in the BNSF Alternative; those features that are in good and excellent condition associated with the BNSF Alternative include riparian areas (not USACE jurisdictional), seasonal riverine, canals/ditches, and vernal pool and swale resources.

6.3.1.2 Common Components

Because the common components have no alternatives, the impacts associated with the construction and operation of these components will be a part of the project regardless of the alternatives ultimately selected. As depicted in Chart 6-3, all aquatic features within the common components have an existing condition of poor or fair. In the Fresno segment, features in fair condition will be reduced to poor condition. In the Pixley segment, these features will be reduced to poor condition or will no longer exist. All of the features in fair condition in the Monmouth segment are expected to remain in fair condition. In all three of these segments, most features with an existing condition of poor will remain in poor condition, but some features will no longer exist.

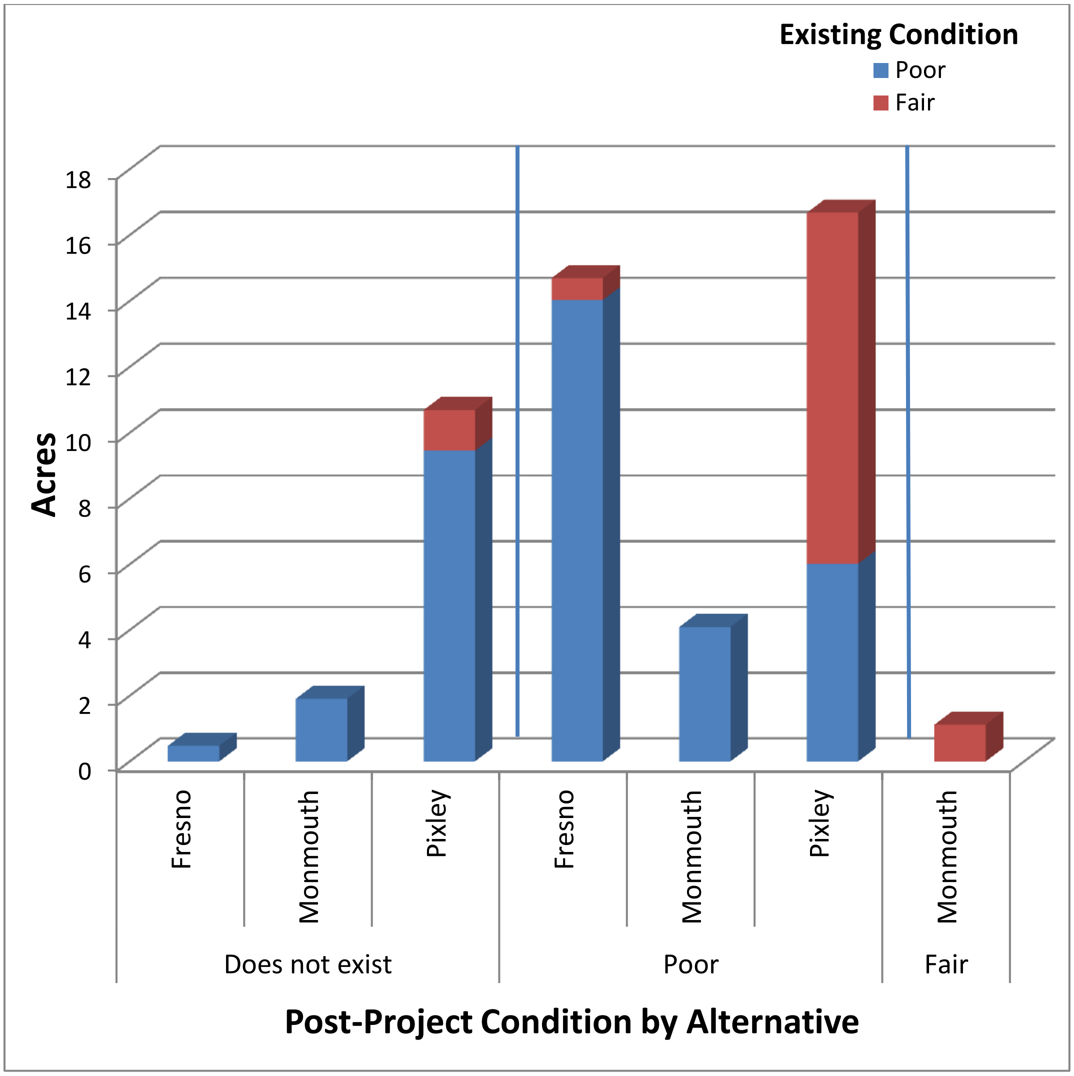


Chart 6-3
Post-Project Condition of Common Components

6.3.1.3 Hanford Alternatives

The Hanford alternatives (the Hanford West Bypass 1 and 2 alternatives) would collectively affect canals/ditches, emergent wetland, lacustrine, riparian (not USACE jurisdictional), seasonal riverine, and seasonal wetland aquatic resources (Section 6.1, Impacts on Aquatic Resources). The existing condition scores of aquatic resource features within these alternatives range from poor to good, with most features in poor condition. After the completion of project construction, riparian and seasonal riverine features in good condition would be reduced to fair condition.

Chart 6-4 provides a comparison of the post-project condition for aquatic features in the five Hanford alternatives (BNSF–Hanford East segment, Hanford West Bypass 1 Alternative at-grade option, Hanford West Bypass 1 Alternative below-grade option, Hanford West Bypass 2 Alternative at-grade option, and Hanford West Bypass 2 Alternative below-grade option). Chart 6-4 illustrates the changes from the existing conditions. The BNSF–Hanford East segment has the largest acreage of aquatic features with an existing condition of good; all of these features would be reduced to a post-project condition of either fair or poor. The reduction in condition from good to a lesser condition class would occur due to direct-permanent impacts on the various seasonal

riverine features (primarily those belonging to the Kings River complex). These features would be reduced but not removed because they would be spanned by a bridge structure. In the Hanford West Bypass alternatives, some features in good condition would remain in good condition because of buffered indirect impacts to emergent wetlands, whereas others would be reduced to fair or poor condition because, as described in Table 6-5 (see Section 6.1.2, Alternative Evaluation), the Kings River complex would be crossed on an elevated structure. The acreage of features reduced from fair to poor is similar across all of the Hanford alternatives except the Hanford West Bypass 2 Alternative, where more features with an existing condition of fair remain in fair condition in the post-project condition.

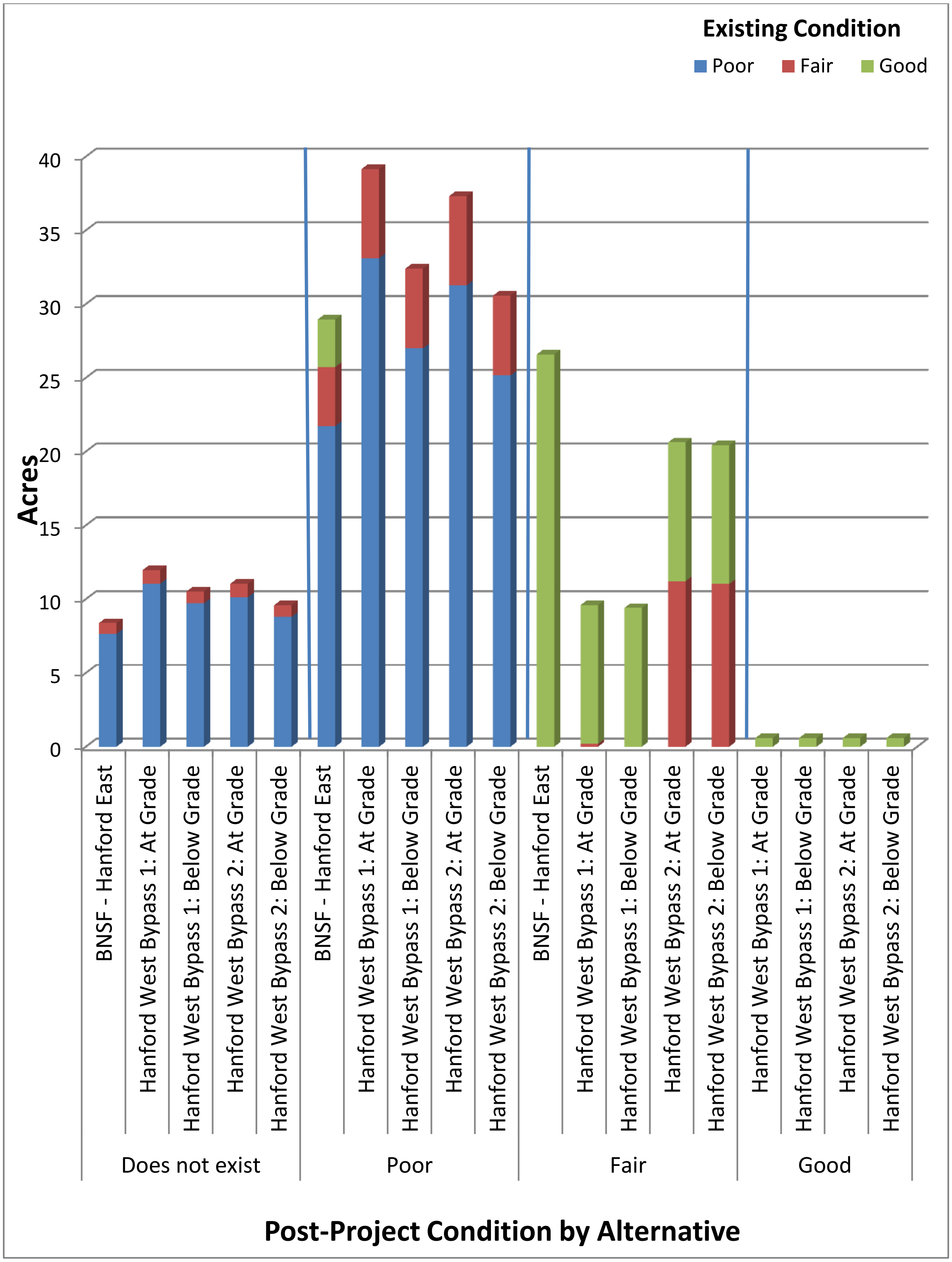


Chart 6-4.
Post-Project Condition of Hanford Alternatives

6.3.1.4 Corcoran Alternatives

The three Corcoran alternatives (BNSF–Through Corcoran segment, Corcoran Elevated Alternative, and Corcoran Bypass Alternative) collectively affect canals/ditches, lacustrine, riparian, seasonal riverine, seasonal wetland, and vernal pools and swales (Table 6-3). The existing condition of aquatic features in the Corcoran area ranges from poor to good, though the majority of aquatic features are in poor condition, and only 0.01 acres are in good condition.

The post-project conditions and the changes in condition for aquatic features are similar for all of the Corcoran alternatives (Chart 6-5). After the completion of project construction, features in good condition (totaling 0.01 acres) would be the reduced to fair condition in all Corcoran alternatives because these impacts would occur in an area where all three alternatives are in close proximity and are essentially the same. Nearly all aquatic features in fair condition, including vernal pools and swales, would be reduced to poor condition or would be removed through the placement of fill and would no longer exist (i.e., post-project condition would be "does not exist").

Although the impacts are generally similar for the Corcoran alternatives, the BNSF-Through Corcoran segment and the Corcoran Elevated Alternative have more acreage that would be lost and more features converted from fair to "does not exist" than the Corcoran Bypass Alternative. The Corcoran Bypass Alternative has the smallest amount of loss (conversion to "does not exist") of fair condition aquatic features.

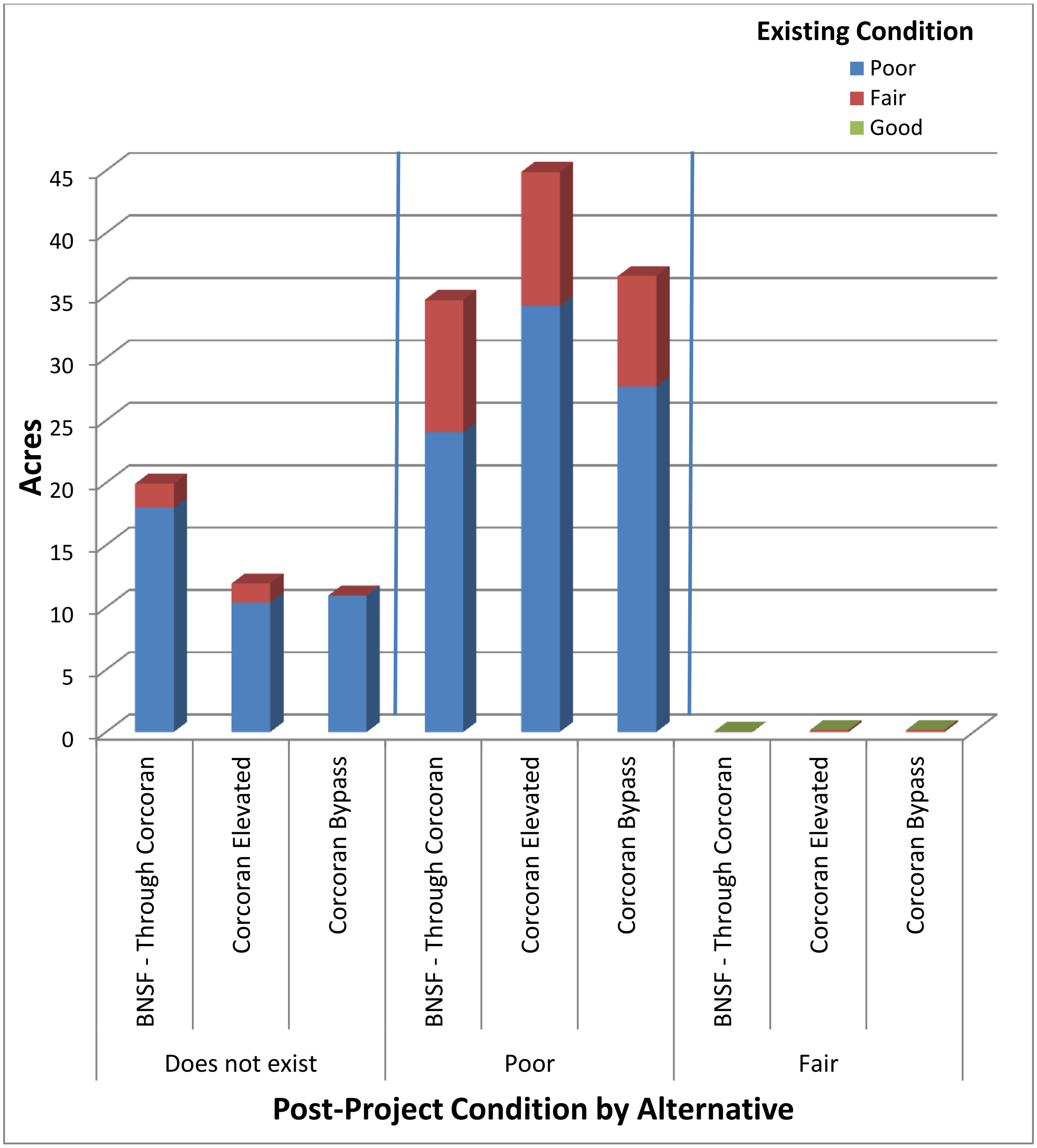


Chart 6-5.
Post-Project Condition of Corcoran Alternatives

6.3.1.5 Allensworth Alternatives

The Allensworth alternatives affect canals/ditches, lacustrine, riparian, seasonal riverine, seasonal wetland, and vernal pools and swales (Table 6-3). The existing condition of these aquatic features ranges from poor to excellent. Both the BNSF–Through Allensworth segment and the Allensworth Bypass Alternative contain more good quality features than any other groups of alternatives (Hanford, Corcoran, Wasco-Shafter, and Bakersfield). A small acreage of excellent features and a significant acreage of good features are associated with the BNSF–Through Allensworth segment. These features are associated with areas of alkali desert scrub that have not been recently disturbed and in many cases are protected as part of the Allensworth Ecological Reserve. The aquatic resources associated with these good and excellent conditions

are vernal pools and swales. Although vernal pools and swales are present in the Allensworth Bypass Alternative and some of these features are in good condition, many are in fair condition—likely as a result of the stressors associated with the adjacent land uses (e.g., orchards, dry land farming).

After the completion of project construction, aquatic features in excellent and good condition would be lost (post-project condition would be "does not exist") or reduced in quality to poor or fair condition (Chart 6-6). The Allensworth Bypass Alternative would have fewer aquatic features in good condition removed or lost and consequently converted to a post-project condition of "does not exist." Therefore, fewer features in good condition would be reduced to poor condition than in the BNSF–Through Allensworth segment.

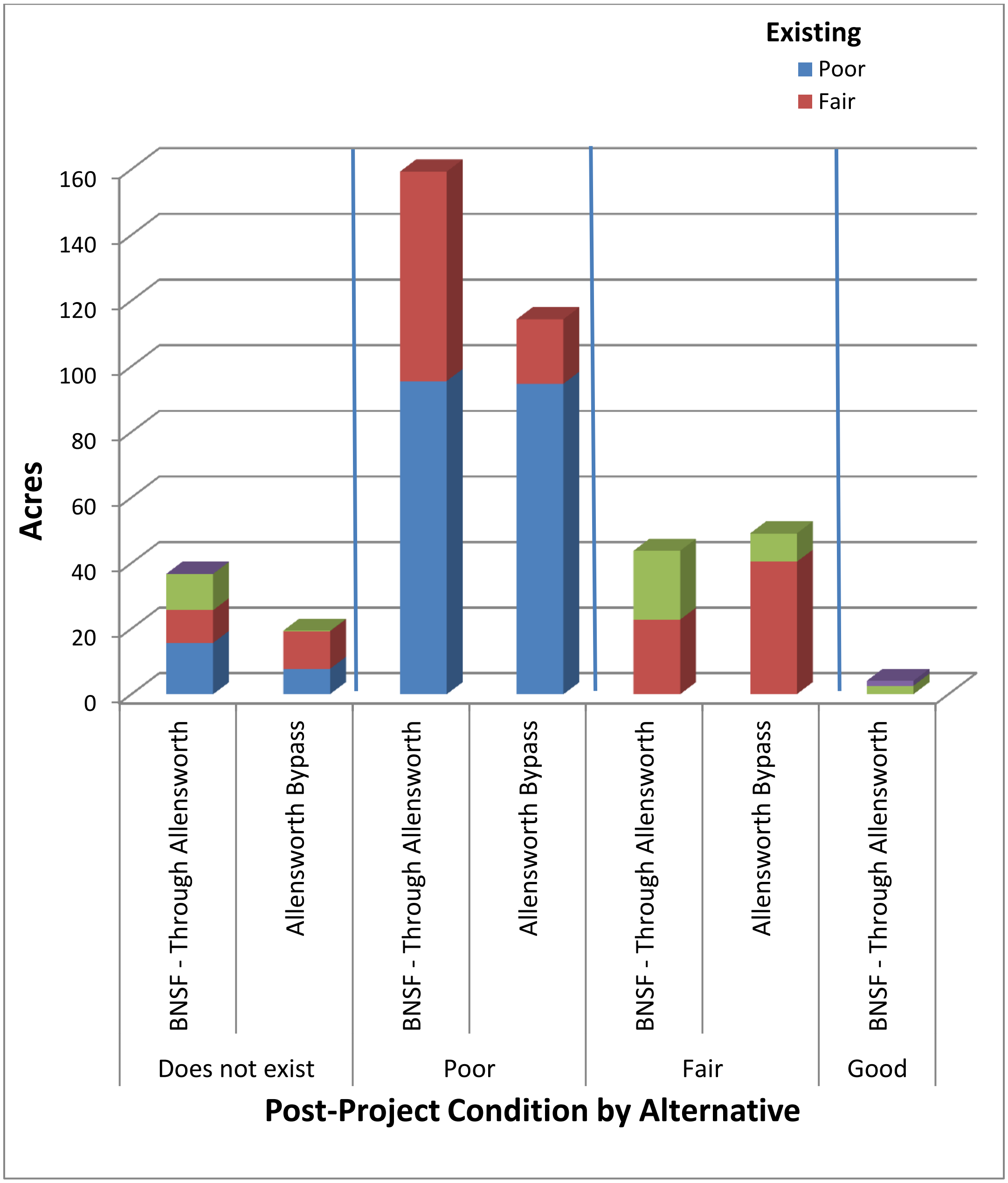


Chart 6-6
Post-Project Condition of Allensworth Alternatives

6.3.1.6 Wasco-Shafter Alternatives

A relatively small acreage of two aquatic feature types, canals/ditches and lacustrine, would be affected by the two Wasco-Shafter alternatives (BNSF–Through Wasco-Shafter segment and Wasco-Shafter Bypass Alternative) (Table 6-3). All of the aquatic features in the Wasco-Shafter area are in poor condition.

The BNSF-Through Wasco-Shafter segment would convert more features in poor condition to a "does not exist" condition as a result of construction and project fill activities than the Wasco-Shafter Bypass Alternative (Chart 6-7). Aquatic features in both alternatives would experience direct-temporary and indirect impacts that are not expected to change the existing poor condition of the resources after construction. However, the BNSF–Through Wasco-Shafter segment would subject a greater amount of poor quality aquatic features to direct-temporary and indirect impacts than the Wasco-Shafter Bypass Alternative.

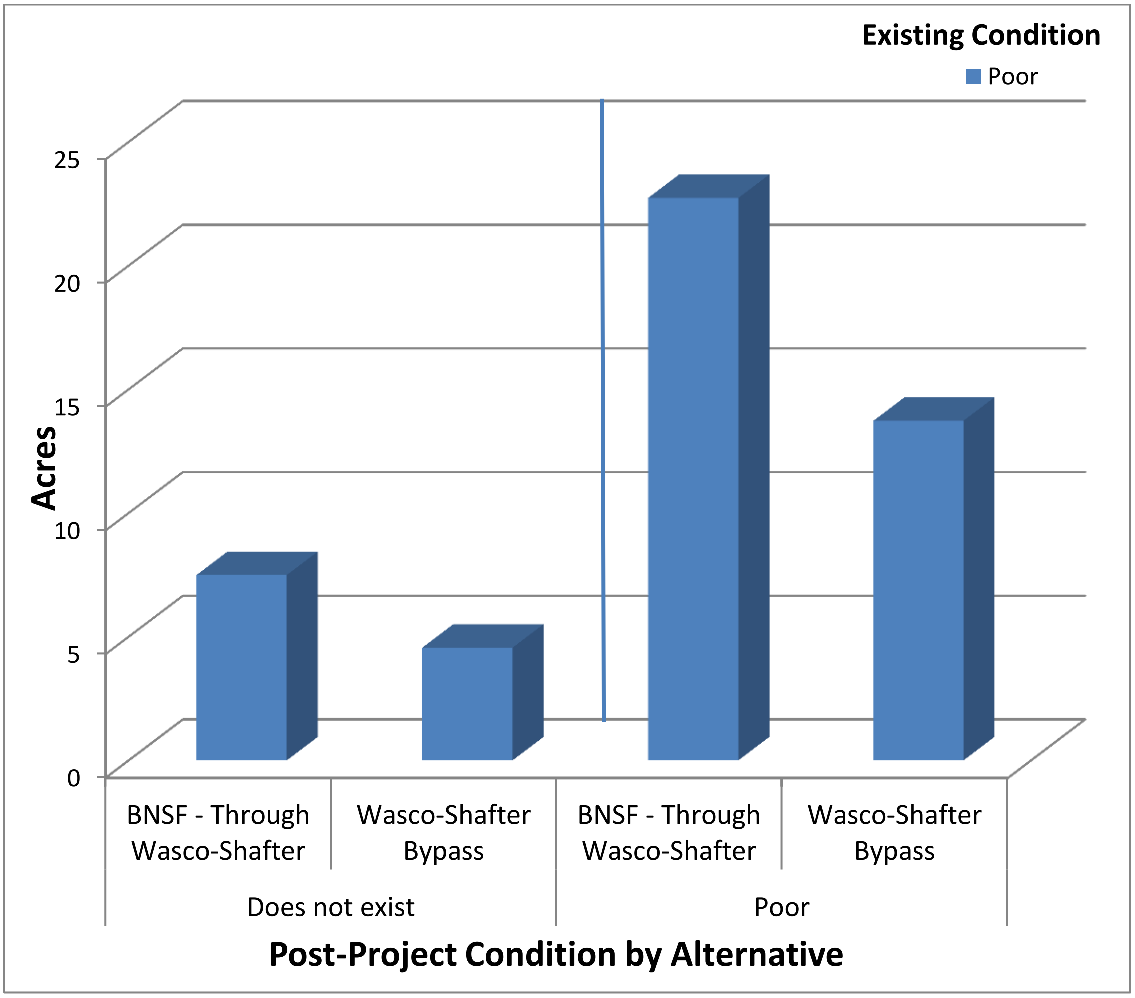


Chart 6-7
Post-Project Condition of Wasco-Shafter Alternatives

6.3.1.7 Bakersfield Alternatives

The three Bakersfield alternatives (BNSF–Bakersfield North segment, Bakersfield South Alternative, and Bakersfield Hybrid Alternative) would collectively affect canals/ditches, emergent wetland, lacustrine, riparian, seasonal riverine, and seasonal wetland features (Table 6-3). The Bakersfield alternatives contain aquatic features in poor, fair, and good condition. The acreages of poor and good features are almost equal; however, few aquatic features are in fair condition (Chart 6-8). For all of the Bakersfield alternatives, the good quality aquatic resources would be reduced to fair condition, but no good quality aquatic features would be lost (i.e., post-p0roject condition of "does not exist") as the result of this project. The aquatic resources that are in good condition include both riparian and seasonal riverine, primarily associated with the Kern River. As described in Table 6-5, an elevated structure would be built to cross the Kern River and the quality or condition of the river may experience some reduction as a result of project direct-temporary or indirect impacts. The reduced conditions associated with the Kern River are the same for the Bakersfield South and Bakersfield Hybrid alternatives. Both the Bakersfield South and the Bakersfield Hybrid alternatives have fewer good condition features that would be converted to fair than the BNSF–Bakersfield North segment.

All Bakersfield area alternatives would convert a small amount of fair quality features to poor condition due direct-temporary and/or indirect impacts. However, the BNSF–Bakersfield North segment would convert slightly more than the other two alternatives (Bakersfield South and Bakersfield Hybrid alternatives). Similarly, all of the Bakersfield area alternatives would change the poor condition features to a condition of "does not exist." Generally, all three Bakersfield area alternatives are similar, but the BNSF–Bakersfield North segment would have higher acreages with a post-project condition of poor and fair due to its overall greater number of impacts (Chart 6-8).

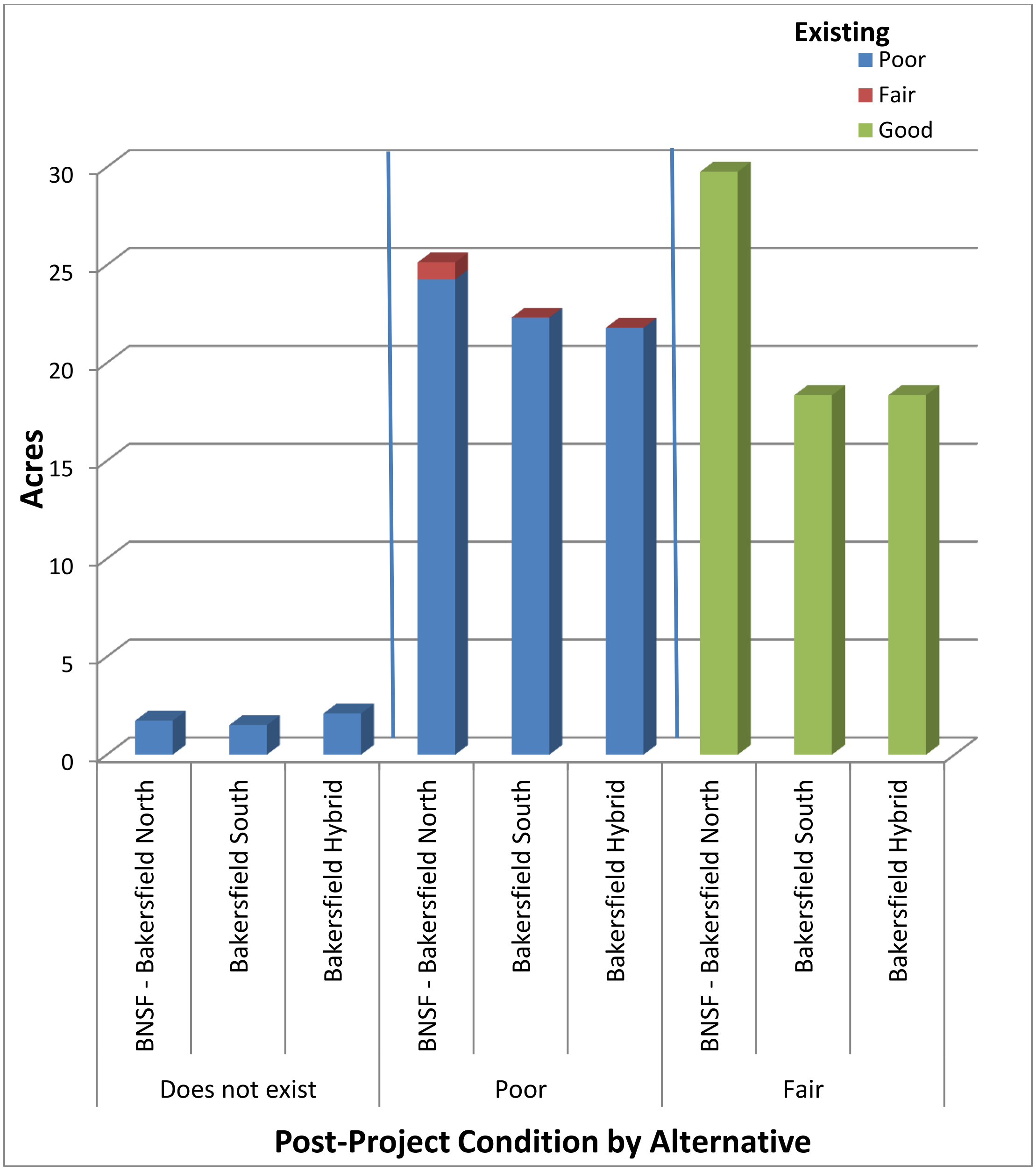


Chart 6-8
Post-Project Condition of Bakersfield Alternatives

6.4 Compensatory Mitigation

Compensatory mitigation for adverse impacts to aquatic resources will be determined in consultation with the USACE and in part through the assessment of the aquatic resource conditions (including functions and values) that would be lost or impaired through construction and operation of the Fresno to Bakersfield Section of the HST System. Compensatory mitigation will preserve, create, and/or enhance aquatic resource conditions, functions, values, and services.

The USACE requires compensatory mitigation of impacts to aquatic resources using a watershed approach in accordance with the 2008 Mitigation Rule. Where watersheds have been highly modified and highly fragmented, as many are in the San Joaquin Valley, the function and value of

wetlands may better be restored if sites are chosen on the basis of quality, location, size, and connectivity—even if this site selection means mitigating outside of a given watershed. The preamble to the 2008 Mitigation Rule recognizes the challenges of mitigating impacts in the same watershed for linear projects. District engineers have the flexibility to allow compensation for linear projects to be conducted on one or multiple sites, based on environmentally preferable and practicable compensatory mitigation options. For linear projects, such as the Fresno to Bakersfield Section, district engineers may determine that consolidated compensatory mitigation projects provide appropriate compensation for the authorized impacts and are environmentally preferable to requiring numerous small permittee-responsible compensatory mitigation projects in a number of watersheds along the linear project corridor.

The USACE recently released guidance on the method used to determine mitigation ratios for different mitigation scenarios. This guidance is published in the *Standard Operating Procedure for Determination of Mitigation Ratios* (USACE 2012). Under these guidelines, mitigation ratios are determined through a standardized procedure that compares project impacts to proposed mitigation sites both quantitatively and qualitatively. Under this guidance, impacts to aquatic resources are evaluated based on their size, location, and type (or type conversion). Furthermore, proposed mitigation sites are also evaluated based on their size, location, and type (or type conversion) as well as their certainty of success and any temporal losses. Impact areas and mitigation sites are compared using CRAM evaluations or other more qualitative methods. Numerical or categorical values are assigned to the results of these evaluations and are used to calculate the required mitigation ratio. The guidelines establish a preference for onsite and in-kind mitigation; however, if this is not practicable or compatible with the proposed project, offsite and/or out-of-kind mitigation may be used. District engineers have the flexibility to allow for out-of-kind mitigation based on environmentally preferable and practicable mitigation options (33 C.F.R. Parts 325 and 332 and 40 C.F.R. Part 230).

6.4.1 Watershed Perspective

Based on the results of the Level 1 Watershed Profile and the Level 2 Impact Evaluation, the compensatory mitigation should focus on improving conditions within the watersheds where the linear project has the most significant detriment to the overall watershed and should focus on improving conditions where aquatic resources have been reduced and opportunities for improvement are present.

Because the Level 1 Watershed Profile and Level 2 Impact Evaluation identified significant vernal pools and swales in the Upper Deer–Upper White Watershed, compensatory mitigation should focus on maintaining and/or improving these features and overall watershed conditions in this watershed. Other watersheds that have significant areas of vernal pools and swales in good condition, and therefore provide an opportunity for improvement which should be considered for vernal pool compensatory mitigation, include Upper Dry, Tulare–Buena Vista Lakes, Upper Kaweah, and Upper Tule watersheds. Because of the sensitivity of vernal pool landscapes, a recent increase in their conversion, and the continued threat of loss, vernal pool compensatory mitigation should include a significant amount of preservation. Creation, reestablishment, and enhancement activities of vernal pool and swale features are seldom successful and carry significant risk in terms of not meeting performance standards. As a lower-risk alternative, the creation, enhancement, or re-establishment of out-of-kind aquatic resources (seasonal or emergent wetland features) may be used to achieve an overall improvement in watershed condition.

Compensatory mitigation for impacts to seasonal riverine features could occur in any of the identified watersheds because these features are present in all watersheds. Selection of compensatory mitigation sites should focus on areas where there is connectivity to protected lands, up-stream stressors are absent or reduced, and opportunities for stream and riparian

habitat enhancement or restoration are available. Given the significant degradation of the watershed landscape, creation, re-establishment, and enhancement opportunities are likely limited and would include significant risk that mitigation may be difficult given the linear nature of these features. Therefore, compensatory mitigation sites for riverine and riparian impacts should be carefully selected to increase the likelihood of success.

Additionally, compensatory mitigation focused on restoring historically valuable aquatic resources such as Tulare Lake would greatly benefit overall watershed condition. The restoration of Tulare Lake and associated historical emergent wetlands could provide both in-kind and out-of-kind mitigation opportunities.

6.4.2 Compensatory Mitigation Options

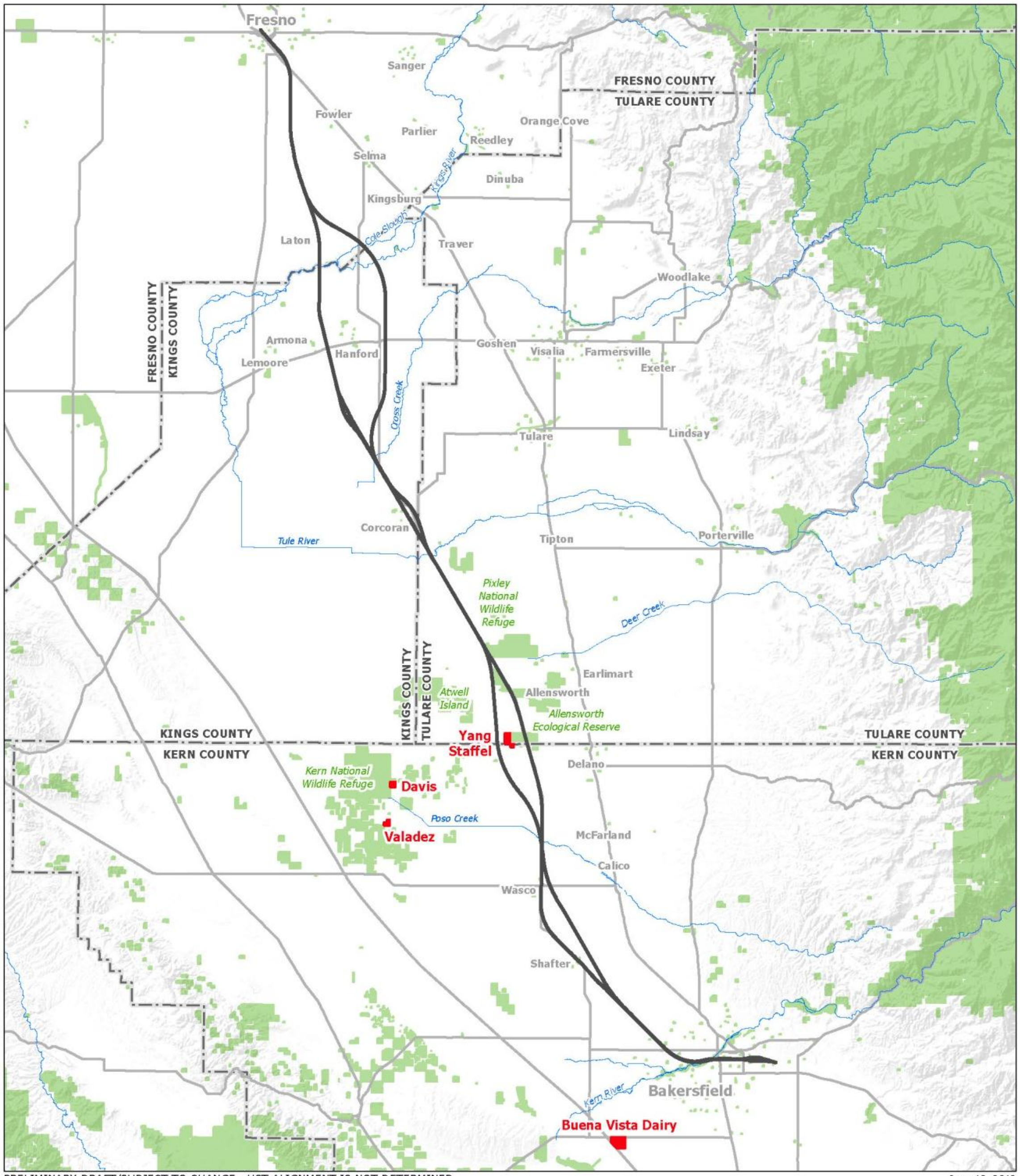
Mitigation banks, in-lieu fee programs, and permittee-responsible mitigation options may be used to satisfy the 2008 Mitigation Rule requirements. However, there are currently no USACE-approved in-lieu fee programs or wetland mitigation banks in the vicinity of the project. Three special-status species conservation banks have been identified that provide mitigation for aquatic special-status species (e.g., vernal pool branchiopods); however, USACE has not approved any of these conservation banks to sell aquatic resource credits. Therefore, the mitigation options for aquatic resources are limited to permittee-responsible activities.

To date, several permittee-responsible mitigation options have been identified that may be suitable to partially or fully mitigate potential impacts to aquatic resources. As described in more detail in the Compensatory Mitigation Plan, five potential mitigation sites containing aquatic features have been identified and are currently under consideration. These five properties include lands adjacent to or in the immediate vicinity of public lands, including the Kern NWR, the Allensworth ER, the Kern Water Bank Authority Conservation Bank, the Semitropic Ecological Reserve, Center for Natural Lands Management lands, vernal pool fairy shrimp critical habitat, Poso Creek, and the Tule River. These properties have been surveyed for the presence of aquatic resources (wetland delineation) and CRAM assessments have been conducted to determine the baseline extent, condition, and suitability for mitigation (preservation, enhancement, re-establishment, or creation) consistent with the 2008 Mitigation Rule. Aquatic resources identified on these properties include vernal pool, depressional wetland, riverine, and riparian resource types.

The CRAM evaluation included evaluating wetland conditions identified on each site based on buffer and landscape context, hydrology, physical structure, and biotic structure using various metrics (and sub-metrics) to address wetland class-specific relationships. CRAM data can be utilized to determine which assessment areas could benefit from restoration or enhancement and which are suitable for preservation. In general, potential mitigation sites with CRAM scores >70 are suitable for preservation, sites with CRAM scores of between 25 and 70 are suitable for enhancement and or re-establishment, and sites with no aquatic resources may be suitable for creation.

CRAM data will also be key in determining the appropriate amounts of compensatory mitigation required to replace or compensate for the loss of wetlands (e.g., an impact to a wetland feature with a high CRAM score would require a higher mitigation ratio to compensate for unavoidable impacts to the wetland feature).

The wetland delineations and CRAM assessments conducted on five properties (i.e., the Buena Vista Dairy, Davis, Staffel Family Trust, Valadez, and Yang properties) identified that these properties, taken together, have a significant area of vernal pools that is suitable for preservation (Figure 6-2). These features are ideal candidates for preservation because they are in good condition. In addition to vernal pools, the Buena Vista Dairy property also has depressional wetlands in good condition that are, therefore, suitable for preservation. Also, the Staffel Family



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HST ALIGNMENT IS NOT DETERMINED
Source: URS, 2012

June 18, 2012

Figure 6-2
Location overview of potential mitigation properties

Trust, Davis, and Valadez properties have depressional wetlands that have potential for enhancement because they have lower CRAM scores.

Re-establishment and creation may be possible on some of the properties identified. Specifically, a historic riverine system is present on the Buena Vista Dairy property that is currently being evaluated to determine its suitability for re-establishment. At several locations, the presence of vegetation (facultative plants) and seasonal wetland depressions suggests that creation of depressional wetlands would provide "ecological lift" to the overall ecosystem of the sites. Both creation and re-establishment would require additional consideration of the potential impacts of land conversion on the special-status wildlife species that are believed to occur on these parcels. Creation and re-establishment may be more appropriate on other properties that are yet to be identified where aquatic resources have been removed through the conversion to agriculture land uses and impacts to special-status wildlife would not occur. Although these resources may be created out-of-kind, they would provide ecological benefits to the landscape and watershed.

The estimated aquatic resource acreage is preliminary and the mitigation proposal will require review and approval by the USACE. Other properties are currently being considered and will be evaluated when the potential for mitigation has been analyzed in more detail. Specifically, further investigations are focusing on properties with potential for riverine and riparian enhancement and properties adjacent to the five properties identified in Table 6-11 that may be suitable for creation or enhancement of aquatic resources The total acreage of compensatory mitigation utilizing preservation, enhancement, and re-establishment has not been finalized. However, suitable opportunities exist in the potential permittee-responsible mitigation properties and in unidentified areas within the project watersheds.

Table 6-11
Potential Mitigation Properties: Acreage, CRAM Scores, and Mitigation Suitability

Mitigation Property	Resource Type	Acres	Average CRAM Score [a]	Mitigation Category
Middle Kern-Upper Tehachapi-Grapevine Watershed				
Buena Vista Dairy properties (715.0 acres)	Vernal pool	243.5	79.2	Preservation
	Depressional wetland	13.3	70.7	Preservation
Upper Deer–Upper White Watershed				
Yang properties (316.4 acres)	Vernal pool	170.0	81.0	Preservation
Staffel Family Trust property (61.2 acres)	Vernal pool	2.8	73.9	Preservation
	Depressional wetland	0.1	N/A	Enhancement
Tulare-Buena Vista Lakes Watershed				
Davis property (158.0 acres)	Vernal pool/swale	28.3	N/A	Enhancement
	Depressional wetland	4.1	69.7	Enhancement
Valadez property (120.0 acres)	Vernal pool	0.2	57.7	Enhancement
	Depressional wetland	0.8	58.5	Enhancement

N/A = not available

[a] Features without a CRAM score are the result of CRAM and wetland protocols classifying features differently. For example, the wetland delineation listed acreage for riverine features, but these features were historical; CRAM classified these same features as depressional wetlands.

CRAM = California Rapid Assessment Method

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Section 7.0

Net Watershed Condition and Recommendations

7.0 Net Watershed Condition and Recommendations

This section provides a high-level discussion regarding the potential post-project condition of the watersheds after implementation of the project, regardless of project alternative, with potential compensatory mitigation (the net watershed condition). At this time, a detailed evaluation is not possible because the project alternatives have not been selected, compensatory mitigation is in the planning phase, and no parcels are currently under contract or approved by the various regulatory agencies.

7.1 Net Watershed Condition

After the implementation of the compensatory mitigation, the HST project is anticipated to result in no net change or in a net increase in condition for the watersheds that would be affected by the project. No change in condition is expected because of the nature of the watersheds and aquatic features in the impact area, as described below, and because the implementation of compensatory mitigation would replace any potential loss through the creation, enhancement, or preservation of aquatic resources.

In general, the Level 1 Watershed Profile identified a number of common themes in each of the affected watersheds, especially in the Great Valley Ecological Section:

1. The conditions of aquatic features in the watersheds are similar, with significant quantities of aquatic features in poor condition and limited numbers of features in good condition.
2. The relative abundance and condition of habitats within watersheds depend on the level of disturbances or stressors on the watersheds.
3. Most of the aquatic features are man-made or manipulated; of the limited natural features that are present, most are affected by some form of disturbance or stressors.
4. Similar aquatic features are present in all watersheds (except in the Upper Deer–Upper White Watershed, where a significantly larger area of vernal pool landscape is present than in the other watersheds).
5. Watershed boundaries have been blurred through extensive water diversion.

Both in terms of the conditions in the watershed and the land uses identified in the watersheds, the Level 2 Impact Evaluation for the project affirms the findings of the watershed profile. As described below, the themes identified in the watershed profile are consistent with the conditions observed within the study area:

1. The vast majority of the aquatic resources in the Great Valley have been significantly degraded through extensive conversion to agricultural, urban, and transportation land uses. As a result, aquatic features are generally in poor condition, though some features, including seasonal riverine and vernal pools and swales, are generally in excellent or good condition. The condition of features in the study area is generally tied to the type of feature (i.e., man-made or manipulated features are typically in poor or fair condition and natural features are generally in good or excellent condition). These conditions were anticipated by the watershed profile and supported in the study area by the CRAM results. However, some vernal pools and swales near the Corcoran alternatives are in fair condition because they are near major stressors (SR 43 and the existing BNSF Railway tracks).

2. The relative abundance and condition of aquatic resources in the study area reflect the relative condition of habitats within their watersheds. For example, aquatic resources within the study area identified through CRAM as being in relatively "poor" condition generally correspond to habitats in the greater watershed most impacted by altered hydrology and land conversion. Likewise, aquatic resources within the study area identified through CRAM as being in relatively "good" condition generally correspond to relatively natural habitats in the watershed.

3. As described in Section 6.1, Impacts on Aquatic Resources, and Section 6.2, Existing Conditions, most aquatic features in the study area are man-made or manipulated. Natural aquatic features are present in the study area; however, their acreage and distribution are limited. The natural aquatic features present (vernal pools and swales and seasonal riverine) are generally in better condition, but many of these features have been subject to disturbance associated with conversation of adjacent areas and in the case of seasonal riverine, the reduction of the flood channel and riparian areas.

4. Similar aquatic features (canals/ditches, lacustrine, emergent wetlands, seasonal wetlands, seasonal riverine, riparian, and vernal pools and swales) are present throughout the study area. Many of the aquatic resources have been manipulated or are man-made to support agricultural land use practices, including canals/ditches, lacustrine, and emergent wetlands. However, as seen in the watershed profile, a higher density of vernal pool features is present in the Upper Deer–Upper White Watershed, which is associated with the Allensworth alternatives.

5. Due to extensive networks of canals and water diversions, clear watershed boundaries were not observed.

The above themes, which were observed in both the Level 1 Watershed Profile and the Level 2 Impact Evaluation, reduce the potential for the project to result in a net negative impact on the project watersheds.

Because most aquatic features that would be affected by the project are already in poor condition, it is not likely that project impacts (especially indirect impacts) would further reduce the condition of the features significantly. Many features in poor condition are currently exposed to stressors such as transportation corridors, agricultural land uses, and urban development; therefore, construction of the HST project would not significantly change the existing condition or significantly modify the watershed profile. The features that are in good or excellent condition are much more likely to experience a reduction in condition due to construction of the HST project. The aquatic conditions (including functions and services) of these features that would be lost as a result of project construction would be the focus of the compensatory mitigation efforts.

After the occurrence of direct-permanent impacts on man-made and manipulated features in the study area, these features would be considered to be completely lost. However, through project engineering design and the inclusion of culverts, hydrological connections associated with canals/ditches would be maintained and the services provided would not be lost. After the occurrence of direct-temporary impacts on man-made and manipulated features in the study area, these features would be restored to pre-project condition after construction, where possible, with no reduction in condition (and with no reduction or loss of functions and services). For example, several canals/ditches will be re-routed to accommodate construction of the HST project but this re-routing would not reduce the condition of these features or diminish their functions and services. The limited natural features that would be affected by the project (i.e., would experience direct-permanent or direct-temporary impacts) are much more susceptible to project impacts and would be reduced both in condition and in terms of functions, values, and

services. The loss of the natural features would be mitigated through compensatory mitigation efforts.

Under a strict interpretation of the watershed-based mitigation, a number of small compensatory mitigation projects would need to be implemented in each of the project watersheds. The numerous small projects required under a strict interpretation would have a limited influence on the overall condition of the regional watershed. In many of the project watersheds, the mitigation would only compensate for impacts to features in poor ecological condition, because the conditions of aquatic resources have been significantly degraded across all of the project watersheds through the conversion of natural land to agricultural and urban land uses.

However, because the watershed boundaries are blurred and similar features were observed in all watersheds, the project area is more realistically considered as a single hydrologic unit. Focusing compensatory mitigation efforts in a subset of this larger watershed will result in larger projects that will improve the conditions in those watersheds and which will provide a greater degree of functional lift for the overall condition of the region. With consideration of these factors, compensatory mitigation should be designed to maintain the condition (in terms of both quantity and quality of aquatic resources) of the greater project region rather than mitigating on a watershed-by-watershed basis.

Compensatory mitigation efforts should focus on locations where mitigation efforts are likely to succeed (i.e., in locations where the risk of failure for enhancement, restoration, and preservation projects is low). Examples of such locations include areas where the aquatic features present are in good condition or are adjacent to good condition aquatic resources and/or protected areas.

In summary, watershed profiles and project impacts evaluations (both in terms of quantity and quality) and compensatory mitigation will be conducted in select areas and will focus on select watersheds (consistent with project impacts to sensitive resources). Sufficient opportunities will be available to provide significant enhancements and benefits to one or more watersheds that will, in both the short term and the long term, provide local and regional ecological benefit (or lift) to the watershed and to existing conditions of the associated aquatic features. In the end, the condition of the watersheds will be sustained or enhanced through the long-term preservation of aquatic resources and will experience no net loss of aquatic functions, values, or services (condition).

7.2 Recommendations

This report is designed to provide an analysis to the USACE of the extent and quality of the wetlands and other jurisdictional features present in the watershed in which the Fresno to Bakersfield Section of the HST System occurs. The purpose of this evaluation is to provide the USACE with information with regard to the extent and quality of the aquatic resources present in the study area and the extent to which these features would be affected by construction and operation of the Fresno to Bakersfield Section. The impacts to existing aquatic resources are organized by watershed and by project alternative so that the project proponents (Authority and FRA), along with the USACE and EPA, can use the data in this report to evaluate, identify, and compare the preferred project alternative and ultimately assist in the identification of the preliminary LEDPA.

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Section 8.0
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8.0 References Cited

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Section 9.0
List of Preparers

9.0 List of Preparers

This section lists the URS-HMM-Arup Joint Venture employees that prepared this report, and provides a summary of their qualifications, roles, and responsibilities in the preparation of this Watershed Evaluation Report.

Name **Title**	**Role**	**Years Experience, Qualifications**
REGIONAL CONSULTANT ENVIRONMENTAL TEAM		
Report Text and Preparation		
Justin Whitfield Project Ecologist	Fresno to Bakersfield Biology Task Manager, organized and planned report preparation.	B.S., Biological Sciences, Florida State University. 10 years of experience conducting biological assessments and preparing environmental documents.
Andrea Coleman Wildlife Biologist	Coordinated watershed data analysis, prepared report text.	B.S., Biology, University of California-Los Angeles. 3 years of experience conducting special-status species surveys and preparing environmental documents.
Amy Langston Wetland Scientist	Coordinated impacts analysis, prepared report text.	M.S., Biology, San Francisco State University. 7 years of experience conducting wetland delineations and preparing environmental documents.
Tammy Lim Wildlife Biologist	Prepared report text.	M.A., Ecology and Systematic Biology, San Francisco State University. 12 years of experience conducting special-status species surveys and preparing environmental documents.
Katie Dudney Senior Ecologist	Prepared report graphs.	M.S., Natural Resources, North Carolina State University. 5 years of experience preparing mitigation and restoration plans.
Tracy Bain Wildlife Biologist	Prepared report text.	B.S., Wildlife Biology, Ohio University. 3 years of experience conducting surveys for special-status wildlife species.
Report Figures		
Rose Abbors Senior GIS Analyst	Fresno to Bakersfield GIS Task Manager.	B.S., Geography, Arizona State University. 6 years of experience in GIS task management and cartographic design.
Jessie Parteno Geographic Information Systems (GIS)	Developed GIS models for watershed and impacts analysis.	B.S., Biology and GIS, University of Guelph. 8 years of experience in GIS Geodatabase design.
Report Review/ITR/DCR		
Chad Roberts CRAM Coordinator; Roberts Environmental and Conservation Planning	Provided technical guidance, conducted Internal Technical Review.	Ph.D., Biology, University of California-Davis. CRAM-certified trainer. 32 years of experience in environmental consulting, owner of Roberts Environmental and Conservation Planning.

Name Title	Role	Years Experience, Qualifications
Report Editing		
Dennis Rowcliffe Senior Technical Editor	Technical Editor	B.A., American Studies and Journalism, California State University, Los Angeles. 21 years of experience editing technical documents.
Jay Plano Technical Editor	Technical Editor	M.A., Political Science, University of California, Berkeley. 23 years of experience in editing technical, legal and business documents.
Deb Fournier Word Processing and Formatting Specialist	Report formatting	10 years of experience creating and formatting word documents.

Appendix A

Evaluation of Wetland Conditions Using the California Rapid Assessment Method (CRAM)

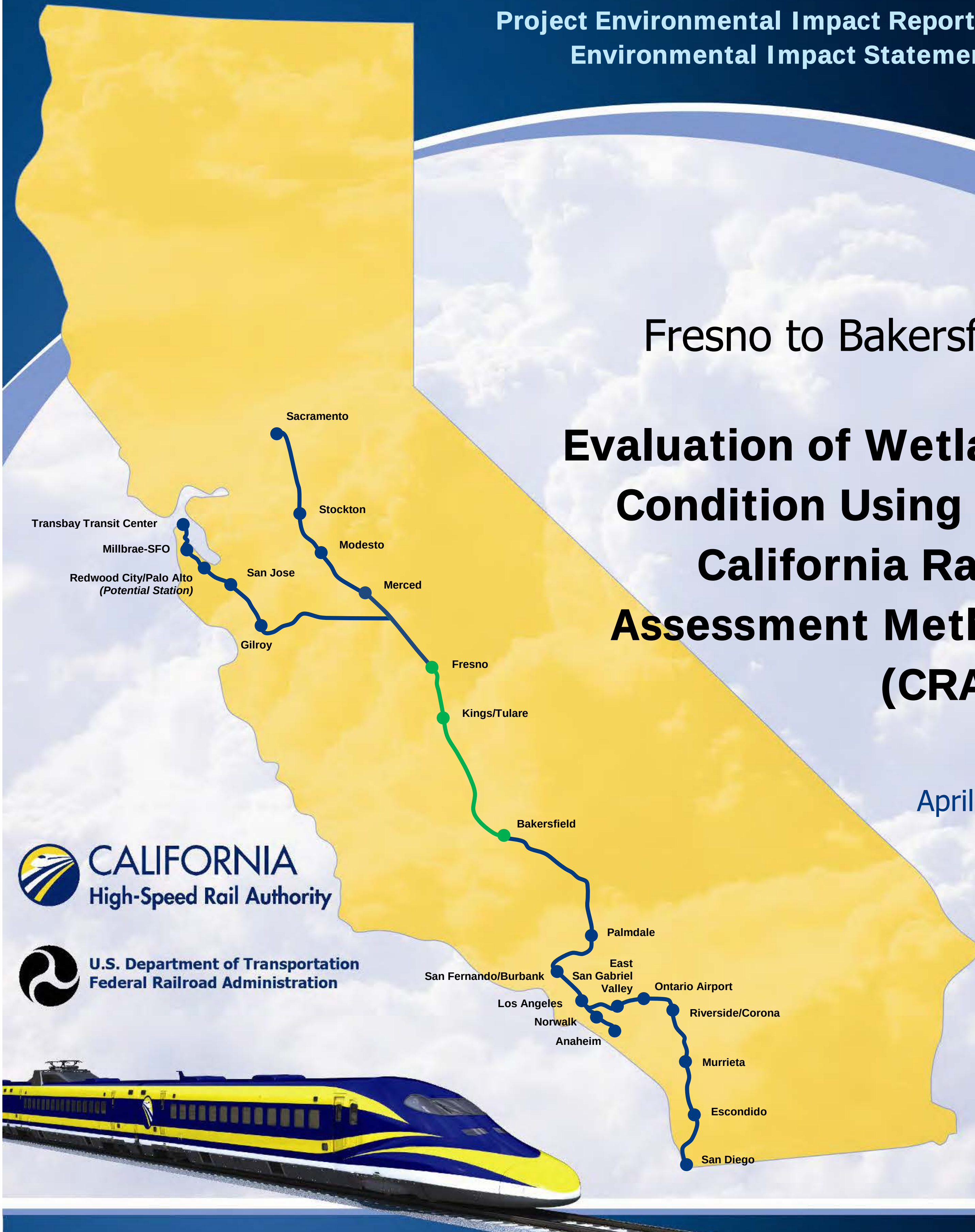
CALIFORNIA HIGH-SPEED TRAIN

Project Environmental Impact Report / Environmental Impact Statement

Fresno to Bakersfield

Evaluation of Wetland Condition Using the California Rapid Assessment Method (CRAM)

April 2013



CALIFORNIA
High-Speed Rail Authority

U.S. Department of Transportation
Federal Railroad Administration

Evaluation of Wetland Condition Using the California Rapid Assessment Method (CRAM)

Prepared by:

URS/HMM/Arup Joint Venture

April 2013

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Acronyms

AA	assessment area
Authority	California High-Speed Rail Authority
BNSF	Burlington Northern & Santa Fe Railway
CRAM	California Rapid Assessment Method
EIR	environmental impact report
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
FRA	Federal Railroad Administration
HMF	heavy maintenance facility
HST	high-speed train
HUC	hydrologic unit code
LEDPA	Least Environmentally Damaging Practicable Alternative
MOU	memorandum of understanding
NAVD 88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act
RTP	Regional Transportation Plan
SR	State Route
USACE	U.S. Army Corps of Engineers

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Section 1.0

Introduction

1.0 Introduction

The *NEPA/404/408 Integration Process Memorandum of Understanding* between the U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (USACE), Federal Railroad Administration (FRA), and California High-Speed Rail Authority (Authority), dated November 2010 (referred to as the MOU), outlines the requirements for Checkpoint C: Preliminary LEDPA Determination for the California High-Speed Trail (HST) project. One of the steps in identifying the Least Environmentally Damaging Practicable Alternative (LEDPA) is to determine the functions and services of the aquatic resources within the different project alternatives. In accordance with the MOU and discussions with the project's technical work group—composed of members from the regulatory agencies, FRA, Authority, and the regional consultants—these determinations will be made by conducting a "detailed (rapid assessment or better) assessment of the functions and services of special aquatic sites and other waters of the U.S" (EPA et al. 2010).

The California Rapid Assessment Method (CRAM) provides the tool for assessing the condition of aquatic resources (CWMW 2012). CRAM is the methodology that is being used across all HST sections to provide a uniform approach for assessing the functions and services (health) of wetlands and other aquatic features, and it is consistent with the USACE and EPA Mitigation Rule (EPA and USACE 2008). A detailed description of CRAM is not included in this report. This information is available on the CRAM web site (www.cramwetlands.org) and in the *California Rapid Assessment Method for Wetlands and Riparian Areas: User's Manual,* Version 6.0 (CWMW 2012), including background information on the development, application, and implementation of CRAM. Additionally, the *Condition Assessment Technical Work Plan* (Authority and FRA 2011a) describes the methods used to conduct CRAM for the Fresno to Bakersfield Section of the HST and is supplemental to the *DRAFT Checkpoint C: LEDPA Determination: Methodology for Wetland Condition Assessment Using CRAM* that was prepared for the entire statewide HST system (Authority and FRA 2011b).

This report summarizes the results of CRAM conducted for the Fresno to Bakersfield Section of the HST during fall 2011 (September 19-29), spring 2012 (March 5-9, May 14-18), and winter 2013. The first two rounds assessed aquatic features within the Fresno to Bakersfield Section study area. The third and fourth rounds assessed aquatic features within potential mitigation sites for the project.

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Section 2.0
Project Location

2.0 Project Location

The Fresno to Bakersfield Section of the HST system lies entirely within the Great Valley Ecological biogeographic area and is surrounded by the Sierra Nevada Foothills and Sierra Nevada sections to the east, the Southern California Mountain and Valley sections to the south, and the Central California Coastal Ranges sections to the west. The study area is located in the central part of the San Joaquin Valley within the Tulare Lake Basin. The Tulare Lake Basin is approximately 16,400 square miles and spans mostly across Fresno, Kings, Tulare, and Kern counties. The topography in this part of the Central Valley is flat-lying, with elevations across the project alternatives and HMFs ranging between +395 feet (North American Vertical Datum of 1988 [NAVD 88]) to +205 feet (NAVD 88). A general downward gradient occurs in the study area to the west-southwest, determined principally by the gentle slope of the vast alluvial fans extending from the Sierra Nevada in the east to the center of the San Joaquin Valley.

2.1 Watersheds and Waterbodies

The Fresno to Bakersfield Section occurs within seven Hydrologic Unit Code (HUC)-8 watersheds in the Tulare Lake Basin. Significant natural waters that intersect with the Fresno to Bakersfield alternative alignments include Kings River, Cross Creek, Tule River, Deer Creek, Poso Creek, and Kern River. The names of the HUC-8 watersheds, the major surface water features, and the area of each watershed are summarized in Table 2.1-1.

Table 2-1
Watersheds and Major Waterbodies within the Fresno to Bakersfield Section

Subbasin (HUC-8 No.)	Major Water Features	Watershed Area (Acres)
Upper Dry (18030009)	Kings River	1,360,539
Tulare-Buena Vista Lakes (18030012)	Kings River, Cross Creek, Tule River	2,423,853
Upper Kaweah (18030007)	Cross Creek	974,462
Upper Tule (18030006)	Tule River	604,506
Upper Deer-Upper White (18030005)	Deer Creek, Friant-Kern Canal	782,998
Upper Poso (18030004)	Poso Creek, Friant-Kern Canal	368,178
Middle Kern-Upper Tehachapi-Grapevine (18030003)	Kern River	1,675,939
Total	—	8,190,475
Acronym: HUC = Hydrologic Unit Code		

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Section 3.0
Project Description

3.0 Project Description

The proposed action is to construct and operate an HST rail line from Fresno to Bakersfield (Figure 3-1). The Fresno to Bakersfield Section is one of nine sections that were identified in the Program EIR/EISs (Authority and FRA 2005, 2008, 2010). The nine HST sections comprise a system that would connect the major population centers of the San Francisco Bay Area with the Los Angeles metropolitan region. The California HST System is planned to be implemented in two phases. Phase 1 would connect San Francisco to Los Angeles and Anaheim via the Pacheco Pass and the Central Valley. Phase 2 would connect from the Central Valley (Merced Station) to the state's capital, Sacramento, and another extension is planned from Los Angeles to San Diego. The HST system is envisioned as a state-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology, which would employ the latest technology, safety, signaling, and automated train control systems. The trains would be capable of operating at speeds of up to 220 miles per hour over fully grade-separated, dedicated track.

The Fresno to Bakersfield Section of the HST project would be approximately 114 miles long, varying in length by only a few miles based on the route alternatives selected. To comply with the Authority's guidance to use existing transportation corridors, when feasible, the Fresno to Bakersfield HST Section would primarily be located adjacent to the existing BNSF Railway right-of-way. Alternative alignments are being considered where engineering constraints require deviation from the existing railroad corridor, and to avoid environmental impacts.

The Fresno to Bakersfield HST Section would cross both urban and rural lands and include a station in both Fresno and Bakersfield, a potential Kings/Tulare Regional Station in the vicinity of Hanford, a potential heavy maintenance facility (HMF), and power substations along the alignment. The HST alignment would be entirely grade-separated, meaning that crossings with roads, railroads, and other transport facilities would be located at different heights (overpasses or underpasses) so that the HST would not interrupt or interface with other modes of transport. The HST right-of-way would also be fenced to prohibit public or automobile access. The project footprint would primarily consist of the train right-of-way, which would include both a northbound and southbound track in an area typically 120 feet wide. Additional right-of-way would be required to accommodate stations, multiple track at stations, maintenance facilities, and power substations.

The Fresno to Bakersfield Section would include at-grade, below-grade, and elevated track segments. The at-grade track would be laid on an earthen rail bed topped with rock ballast approximately 6 feet off the ground; fill and ballast for the rail bed would be obtained from permitted borrow sites and quarries. Below-grade track would be laid in an open or covered trench at a depth that would allow roadway and other grade-level uses above the track. Elevated track segments would span long sections of urban development or aerial roadway structures and consist of steel truss aerial structures with cast-in-place, reinforced-concrete columns supporting the box girders and platforms. The height of elevated track sections would depend on the height of existing structures below, and would range from 40 to 80 feet. Columns would be spaced 60 feet to 120 feet apart.

3.1 High-Speed Train Alternatives

The project EIR/EIS for the Fresno to Bakersfield HST Section examines alternative alignments, stations, and HMF sites within the general BNSF Railway corridor. Discussion of the HST project alternatives begins with a single continuous alignment (the BNSF Alternative) from Fresno to Bakersfield. This alternative most closely aligns with the preferred alignment identified in the Record of Decision (ROD) for the Statewide Program EIR/EIS. Descriptions of the additional eight alternative alignments that deviate from the BNSF Alternative for portions of the route then

follow. The alternative alignments that deviate from the BNSF Alternative were selected to avoid environmental, land use, or community issues identified for portions of the BNSF Alternative (Figure 3-1). The Authority and FRA, in coordination with USACE and EPA, will identify the least environmentally damaging alternative to comply with Section 404 of the Clean Water Act.

The Fresno to Bakersfield Revised Draft EIR/Supplemental Draft EIS (Authority and FRA 2012) evaluates 10 alignment alternatives including the No Project Alternative, BNSF, Hanford West Bypass 1, Hanford West Bypass 2, Corcoran Elevated, Corcoran Bypass, Allensworth Bypass, Wasco-Shafter Bypass, Bakersfield South, and Bakersfield Hybrid (Figure 3-1). In addition to the alternative alignments, two station alternatives in Fresno, two potential station locations in the Hanford area, three station alternatives in Bakersfield, and five potential heavy-maintenance facility alternatives are considered.

The Fresno to Bakersfield Section would connect to Merced to the north and to Palmdale to the south. A HST rail heavy vehicle maintenance and layover facility would be sited in either the Merced to Fresno Section or Fresno to Bakersfield Section. Additional details on project features and construction are presented in the Fresno to Bakersfield Revised Draft EIR/Supplemental Draft EIS (Authority and FRA 2012).

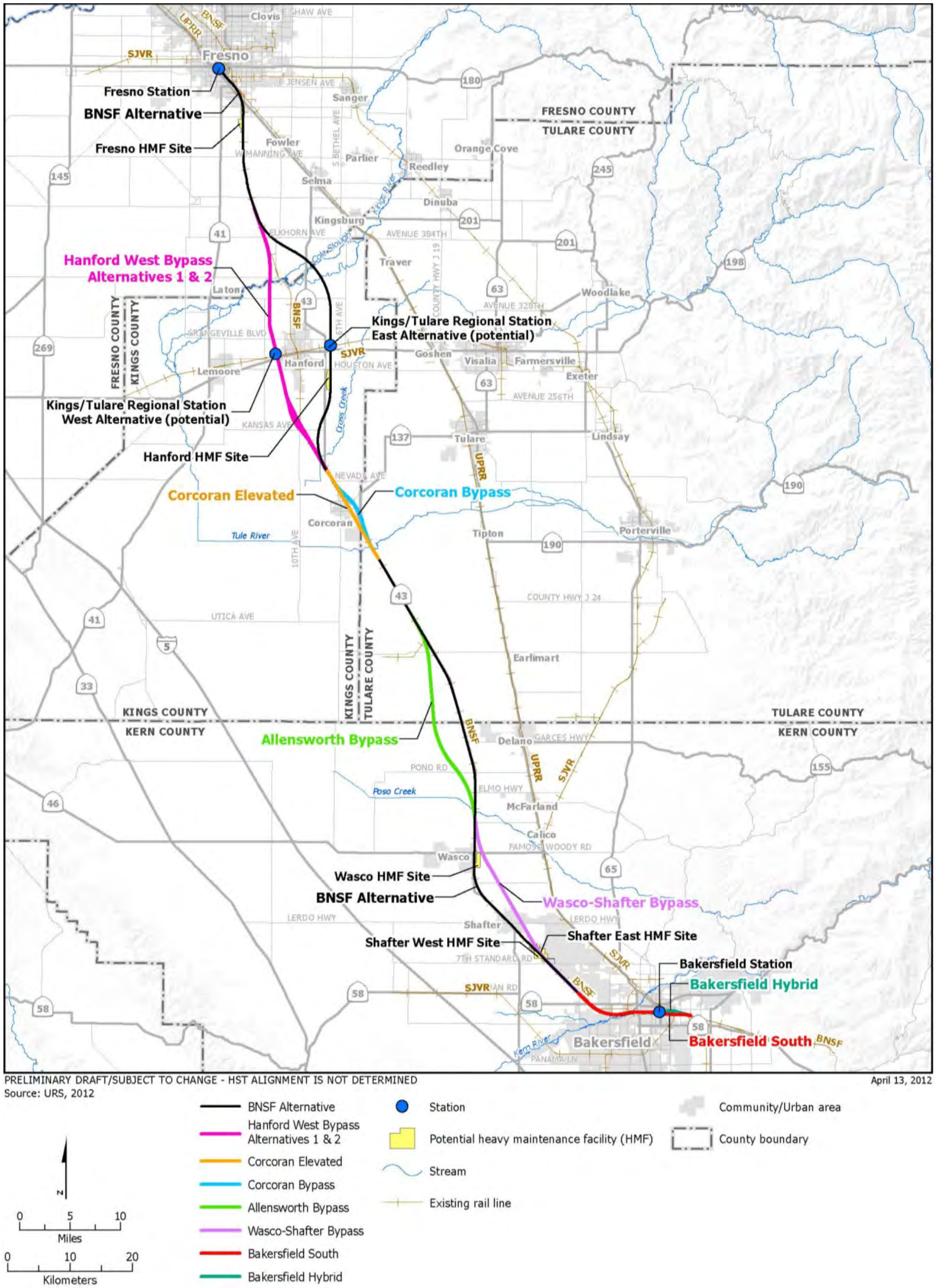

Figure 3-1
Fresno to Bakersfield HST alternatives

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Section 4.0
Methods

4.0 Methods

The methodology for conducting CRAM is described in the *California Rapid Assessment Method for Wetlands and Riparian Areas: User's Manual,* Version 6.0 (CWMW 2012). This section provides details on pre-field preparations, the CRAM team for the Fresno to Bakersfield Section, and field methods and limitations particular to this section of the HST.

4.1 Wetland Classification

CRAM uses a wetland classification derived primarily from the functional classification described in the Hydrogeomorphic Method (Brinson 1993). The CRAM typology includes five wetland types: riverine wetlands, depressional wetlands, estuarine wetlands, lacustrine wetlands, and slope wetlands. All but lacustrine wetlands have been divided into sub-types. Riverine wetlands and depressional wetlands and their sub-types were used in the CRAM assessment for the Fresno to Bakersfield Section.

The *Preliminary Jurisdictional Waters and Wetlands Delineation Report* (Authority and FRA 2011c) submitted for the Fresno to Bakersfield Section described Special Aquatic Resource (SAR) types that were identified in the study area using the Cowardin system. This system is similar but not equivalent to the standard CRAM typology. A "crosswalk" was used to standardize the aquatic feature terms to standard wetland classification in accordance with CRAM (Table 4.1).

Table 4-1
Crosswalk of Standard Terms Used for Wetland Condition Assessment

Preliminary Jurisdictional Waters and Wetland Delineation Report		
SAR Type	**Cowardin Type**	**CRAM Type**
Canal[a]	Riverine unconsolidated bottom	Riverine wetlands (streams and rivers-channel)
Ditch[a]	None assigned	Riverine wetlands (streams and rivers-channel)
Reservoir[a]	Lacustrine unconsolidated bottom	Lacustrine
Emergent wetland	Palustrine emergent nonpersistent	Depressional wetlands (except vernal pools and swales, marsh, and unvegetated flats)
Retention/detention basin[a]	Lacustrine unconsolidated bottom	Depressional wetlands (except vernal pools and swales, marsh, and unvegetated flats)
Riparian	Riverine forested wetland	Riverine wetlands (sub-types confined and non-confined streams and rivers-channel)
Seasonal riverine	Riverine unconsolidated bottom	Riverine wetlands (sub-types confined and non-confined streams and rivers-channel)
Seasonal wetland[b]	Palustrine emergent nonpersistent	Depressional wetlands (except vernal pools and swales, marsh, and unvegetated flats)

Table 4-1
Crosswalk of Standard Terms Used for Wetland Condition Assessment

Preliminary Jurisdictional Waters and Wetland Delineation Report		CRAM Type
SAR Type	**Cowardin Type**	
Vernal pool	Palustrine emergent nonpersistent	Individual vernal pools and vernal pool systems (subtypes of Depressional)
Vernal swale	Palustrine emergent nonpersistent	Individual vernal pools and vernal pool systems (subtypes of Depressional)

[a] Man-made environment; it should be noted that the riverine module is acknowledged in CRAM to be applicable to "flowing-water" man-made features such as ditches and canals.

[b] This habitat type can contain seasonal (ephemeral) wetlands.

Acronym:
CRAM California Rapid Assessment Method
SAR Special Aquatic Feature

4.2 CRAM Team Members

The individuals involved in the field aspects of this study are listed in Table 4.2-1.

Table 4-2
Fresno to Bakersfield CRAM: Key Staff Members

Staff	Education	Experience	Project Role
Chad Roberts/Roberts Environmental and Conservation Planning	PhD, Ecology, University of California-Davis	CRAM Principal Investigator Group	CRAM Coordinator
Justin Whitfield/Joint Venture	BS, Biology, Florida State University	10 years' experience in preparing biological assessments, environmental documents, and wetland delineations	Biology Task Manager
Amy Langston/Joint Venture	MS, Biology, San Francisco State University	7 years' experience conducting wetland delineations and botanical surveys	CRAM field and office support
Chris Julian/Joint Venture	BS, Biology, University of California-Santa Barbara	9 years' experience in wetland permitting, and conducting wetland delineations and wetland functional assessments	CRAM field and office support

Table 4-2
Fresno to Bakersfield CRAM: Key Staff Members

Staff	Education	Experience	Project Role
Julie Love/Joint Venture	MS, Environmental Science and Management, University of California-Santa Barbara	9 years' experience conducting wetland delineations, habitat restoration and monitoring, and stream monitoring	CRAM field and office support
Galen Peracca/Joint Venture	MF, Forestry, University of California-Berkeley	8 years' experience conducting wetland delineations, botanical surveys, and biological impact analysis	CRAM field and office support
Erin Maroni/Joint Venture	BS, Environmental Science, University of New Hampshire	3 years' experience participating in wetland delineations and habitat assessments.	CRAM field support
Tammy Lim/Joint Venture	MA, Ecology, San Francisco State University	12 years' experience as a field biologist conducting protocol-level surveys and habitat assessments	CRAM field support

Acronym:
CRAM California Rapid Assessment Method

The individuals identified above comprised the CRAM assessment team that carried out the fieldwork and/or provided technical guidance. The team was led by Chad Roberts. Dr. Roberts was selected as the CRAM coordinator/team leader because of his involvement in the development of CRAM as a member of the CRAM North Coast Regional Team. The other team members were not previously CRAM-trained; however, Amy Langston, Galen Peracca, and Justin Whitfield gained sufficient CRAM experience in the process of completing the work to be designated as competent in the CRAM methodology, and Julie Love and Chris Julian completed a formal CRAM training course. Erin Maroni and Tammy Lim, not formally CRAM-trained, assisted CRAM-trained team members in the field for CRAM conducted at potential mitigation sites. The team members led by Dr. Roberts were included in the team because of their experience and knowledge of aquatic features and wetland vegetation.

4.3 Procedures for Using CRAM

CRAM works by scoring four key attributes: Buffer and Landscape Context, Hydrology, Physical Structure, and Biotic Structure. All CRAM modules assess these four attributes, using various metrics (and submetrics) to address wetland class-specific relationships. In all modules, the CRAM "Index Score," or overall score, is calculated as the average of the four attribute scores. The condition assessment of wetlands for the Fresno to Bakersfield Section and potential mitigation sites used CRAM according to the most recent field books for the four modules: riverine, depressional, individual vernal pool, and vernal pool systems (Table 4.1-1).

4.3.1 Assessment Areas

In CRAM, the conditions attributed to wetland areas in a site or region are based on the conditions sampled in "assessment areas" (AAs), which are chosen to represent the wetlands within the site or region. The AAs in the Fresno to Bakersfield Section were identified by the CRAM team and GIS staff, accommodating site access constraints (see Section 4.3.3), and were reviewed by Chad Roberts, the CRAM coordinator. Some potential AAs were rejected as not consistent with CRAM guidance (e.g., an area substantially smaller than suggested guidance was rejected as too small), and other AAs were modified or redesignated (e.g., reclassified as depressional instead of riverine because of a lack of connection to a linear water feature) to be consistent with CRAM assessment practices. All draft AAs scheduled for field evaluation were classified according to standard CRAM assessment categories regardless of other classification categories. Before conducting CRAM fieldwork, a field packet was created for each prospective AA, including maps at necessary scales, showing a preliminary boundary for each AA, as well as a field book with necessary text and work tables for conducting CRAM.

AAs are identified in this report according to CRAM module type. Each AA has a unique identifier code that begins with a letter identifying the type of CRAM module applied (D=depressional, V=vernal pool, VS=vernal pool system, R=riverine). AAs within the study area include a number within the 1–299 range (e.g., R8, D105, VS212). AAs within the potential mitigation sites include a number in the 300–399 range (e.g., VS304).

Figures 4-1 and 4-2 show index maps of all the AA locations within the study area and potential mitigation areas. Appendix A provides maps of all the AAs evaluated for this report.

4.3.2 Field Assessment

Field assessments were conducted in four rounds: September 19–29, 2011, March 5–9, 2012, May 14–18, 2012, and January 3-4, 2013. The first two rounds assessed aquatic features within the Fresno to Bakersfield Section study area. The third and fourth rounds assessed aquatic features within potential mitigation sites for the project. The first round of CRAM fieldwork was conducted outside the vernal pool wetlands assessment window at the request of the EPA and USACE staff, in order to meet the project timeline goals. Though it occurred outside the assessment window, the results are considered valid. Any deviations from standard CRAM methodology are described in Section 4.3.3.

As required by CRAM, the field team modified AA boundaries during fieldwork to better capture the conditions present in the AAs at the time of the assessment. Additionally, some AAs were shifted to more appropriate locations that better represented the wetlands present. The revisions to AA boundaries made in the field were used by the GIS staff to update the CRAM maps. The results and maps provided in this report reflect the AAs and field conditions identified by the field team at the times that CRAM fieldwork was conducted.

4.3.3 Field Conditions and Limitations

The first round of CRAM fieldwork occurred outside the appropriate assessment window for vernal pool wetlands, which corresponds with the growing season and which extends from March to July (CWMW 2009). Much of the vegetation associated with vernal pools was desiccated and reduced in cover, and identification of dominance was based on the familiarity of project team members with the dry-season appearances of species that grow in the study area. In addition, direct evidence of hydrology in natural seasonal wetlands was limited, although hydrology indicators used in CRAM are typically present throughout the year. Another exception, due to deep water levels, occurred in assessing the Kern River, where the AA had to be positioned along only one bank, and the data extrapolated for the entire width of the river. The details for this

situation are described in Section 6.1.2. All exceptions to standard CRAM assessment methodology (e.g., the identification of vernal pool-endemic plants, assessment windows) were executed with consultation from the CRAM coordinator, EPA, and USACE.

The first two rounds of CRAM fieldwork were conducted within the Fresno to Bakersfield Section study area, which includes the project footprint and a 250-foot buffer surrounding the footprint. The footprint includes all areas where aquatic features will be directly impacted by the project. The 250-foot buffer accounts for aquatic features that may be indirectly affected by the project. Because permission to enter was not available for all aquatic features in the study area, the Fresno to Bakersfield regional consultants requested permission to enter from the various private and public landowners. That is, CRAM assessments were only conducted where permission had been granted to the consultant team to enter private land. Therefore, a condition assessment of all aquatic features or all feature types present within the study area was not possible. Instead, a representative sample of accessible aquatic features was selected for CRAM fieldwork. The sample included canals, ditches, retention/detention basins, seasonal riverine, seasonal wetlands, vernal pools, and vernal swale and pool complexes. Access to emergent wetland and reservoirs was not granted. Vernal swales were represented in AAs of vernal pool systems. Best professional judgment, along with direction from the CRAM coordinator regarding an appropriate CRAM sample frame and consultation with the EPA and USACE, were followed in selecting the sample of AAs.

The third and fourth rounds of CRAM fieldwork were conducted on seven private properties being considered for compensatory mitigation. Permission to enter was granted for all seven. The following six properties were evaluated during the third round of CRAM: Buena Vista Dairy, and the Davis, Staffel, Te Velde, Valadez, and Yang properties. Clark River Ranch was evaluated during the fourth round of CRAM.

4.3.4 Post-Field Data Evaluation

After completion of each round of fieldwork, the scoring results were entered into an Excel spreadsheet by the CRAM team and reviewed by Chad Roberts. The spreadsheet was compared with the field data forms for quality-assurance purposes, particularly for data entry and computational errors. The Excel spreadsheet is the basis for this summary report. Both the spreadsheet and the original field data forms are available to agency staff for review purposes. Additionally, AA boundary maps, data forms, stressor checklists, and site photographs are provided in the attached appendices.

Following the field surveys for the Fresno to Bakersfield study area, CRAM data collected using the individual vernal pools and vernal pool systems field books (Version 5.0.3) were revised according to the new vernal pool field books (Version 6.0), which were released after the fieldwork for the Fresno to Bakersfield Section study area was completed. Scores for these AAs were updated based on the new field books at the recommendation of the CRAM coordinator. These scores are presented in this report. The AAs for vernal pools, vernal pool systems and riverine wetlands at potential mitigation sites were assessed in the field using Version 6.0 of the field books.

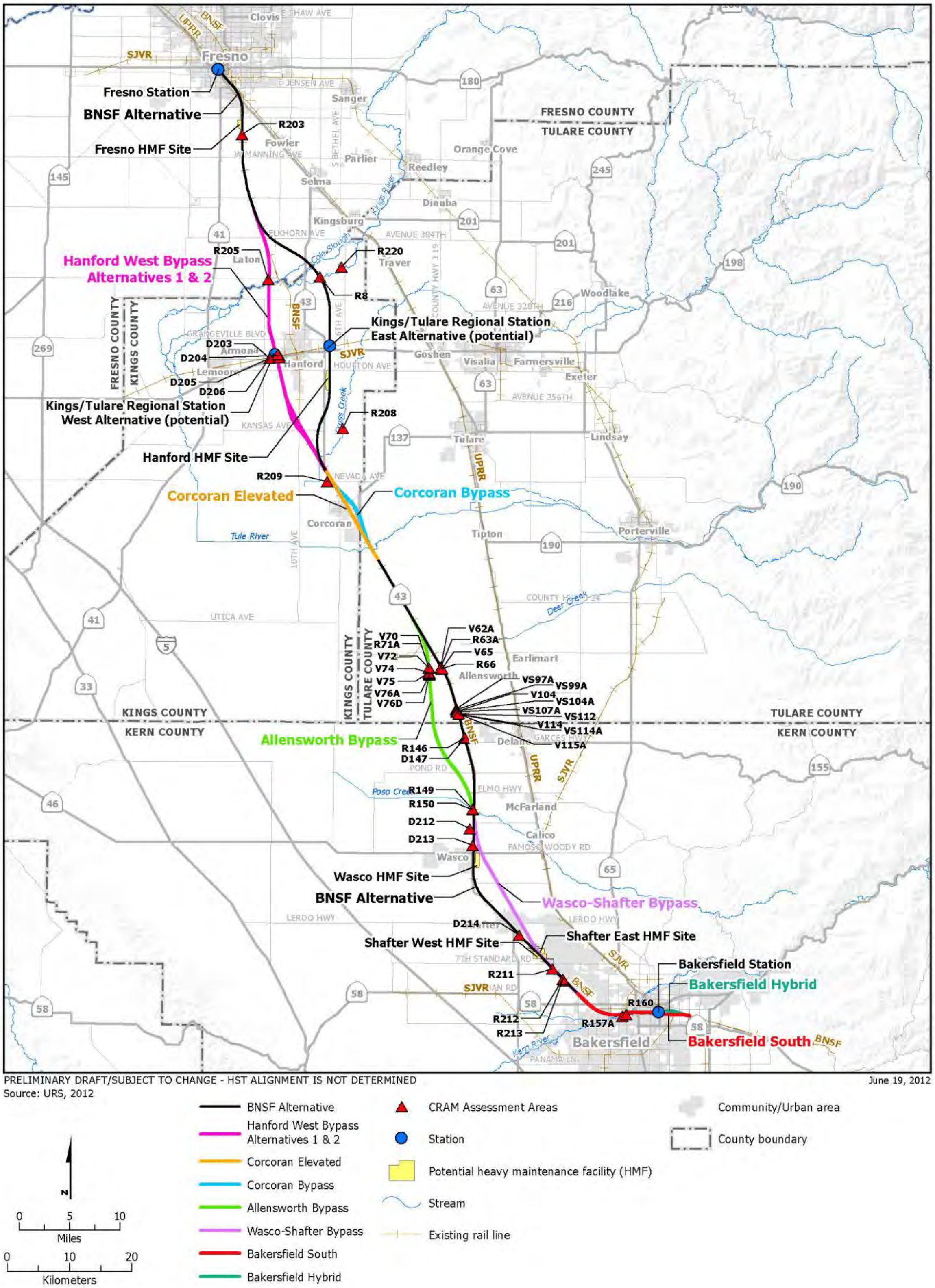

Figure 4-1
Index map of CRAM AAs in the study area

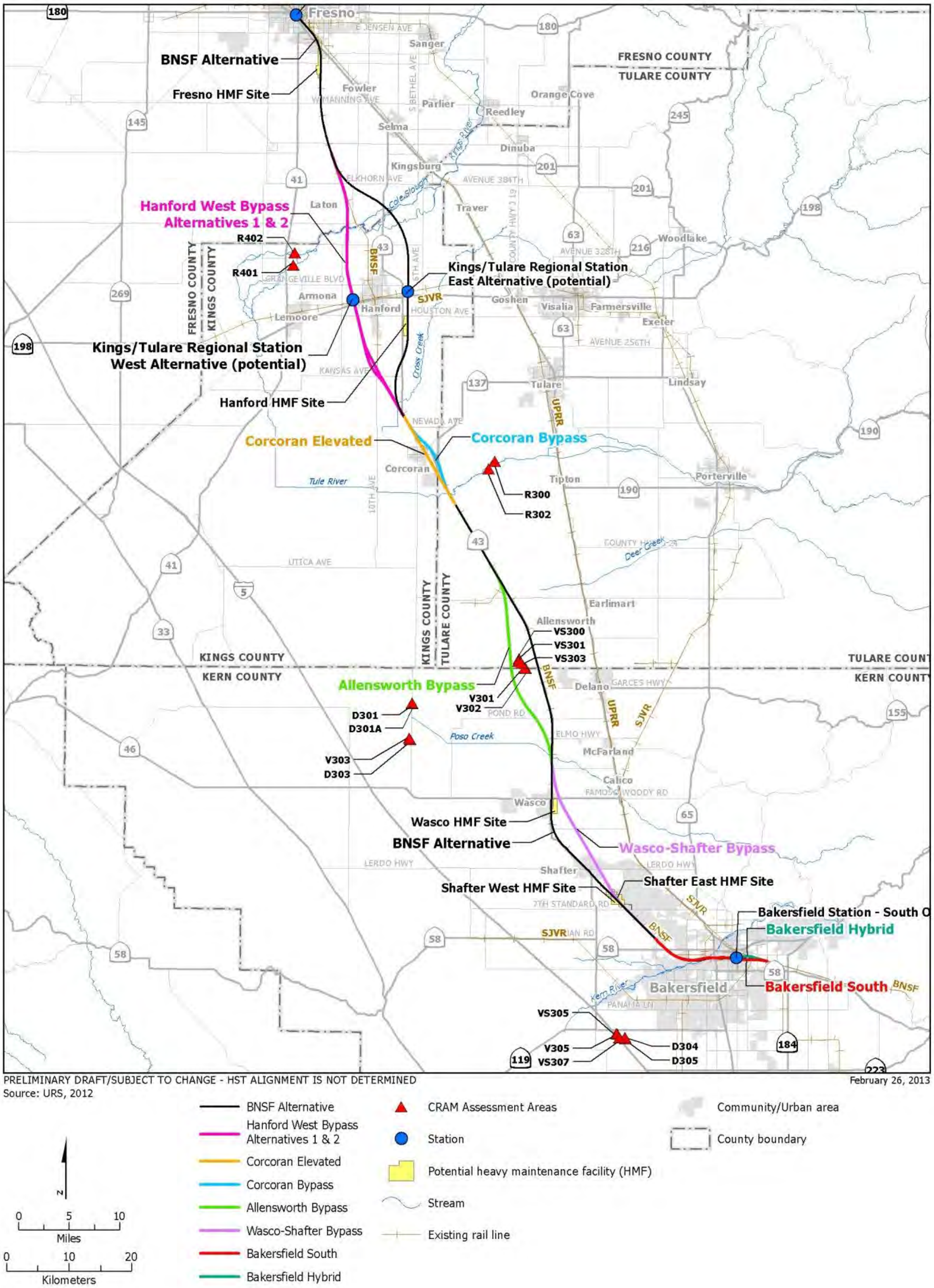

Figure 4-2
Index map of CRAM AAs at mitigation sites

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Section 5.0

Results

5.0 Results: Fresno to Bakersfield CRAM Scores

This section presents the CRAM scores from the condition assessment conducted in the study area of the Fresno to Bakersfield Section (Sections 5.1-5.5), as well as CRAM scores from AAs within the potential mitigation sites (Section 5.6). Forty-two AAs were assessed within the Fresno to Bakersfield Section and 16 AAs were assessed within potential mitigation sites. A table summarizing the results for all of the AAs is provided in Appendix B and data forms are provided in Appendix C. Representative photos of the AAs are provided in Appendix D.

Assessment areas were set up using four CRAM wetland types within the Fresno to Bakersfield section of HST: (1) depressional wetlands, (2) riverine wetlands, (3) individual vernal pools, and (4) vernal pool systems. These wetland types correspond to CRAM field books, which were used to assess the AAs. A summary of the CRAM scores for each CRAM wetland type is presented in Table 5-1. Possible CRAM scores range from 25 to 100. CRAM scores of AAs within the Fresno to Bakersfield Section ranged from 27.8 to 82.7.

Table 5-1
Average Index and Attribute Scores by CRAM Type, by Wetland Type

CRAM Type	Number of AAs	Average Index Score	Average Attribute Scores			
			Buffer and Landscape Context	Hydrology	Physical Structure	Biotic Structure
Depressional Wetland	8	46.0	35.1	54.1	40.7	54.1
Agricultural Reservoir	4	40.5	30.8	45.8	37.6	47.9
Detention Basin	2	42.3	33.2	58.3	25	52.7
Seasonal Basin	2	60.7	45.4	66.7	62.5	68.1
Riverine Wetland	17	55.2	66.3	57.4	45.7	51.4
Canal/Ditch	10	48.1	63.5	50.8	36.4	41.7
Seasonal Riverine	7	65.4	70.3	66.8	59.1	65.2
Individual Vernal Pool	11	70.0	73.6	87.1	54.5	64.8
Vernal Pool System	6	79.2	83	91.7	75	67.4

Acronyms:
AA assessment area
CRAM California Rapid Assessment Method

5.1 Depressional

Eight AAs were assessed using the depressional wetlands module. The scores are based on the assessment of six retention/detention basins and two isolated seasonal wetlands (basins) that appear to be remnants of a former riverine feature. The six retention/detention basins are located throughout the Fresno to Bakersfield study area and are composed of four agricultural basins and two urban basins. The retention/detention basins all received similar scores. Because they are immediately surrounded by agricultural land or urban development, the retention/detention basins scored particularly low on the Buffer and Landscape Context Attribute.

A manipulated hydrologic regime accounted for the low scores on the Hydrology Attribute and the general lack of physical and biotic structural complexity resulted in low scores on the Physical Structure and Biotic Structure Attributes.

Two isolated seasonal wetland basins in Hanford were assessed as depressional wetlands. These features are remnant segments of a natural channel and are now hydrologically closed off from a flow-through system. These features scored higher than the retention/detention basins as a result of being surrounded by larger buffers and having a predominantly natural water source (groundwater). Because these two features, unlike the retention/detention basins, were vegetated and had some degree of topographic complexity, they scored higher, in general, on the Physical and Biotic Structure Attributes.

Figure 5-1 shows the average CRAM index scores and attribute scores for retention/detention basins and seasonal wetlands evaluated using the depressional wetland module.

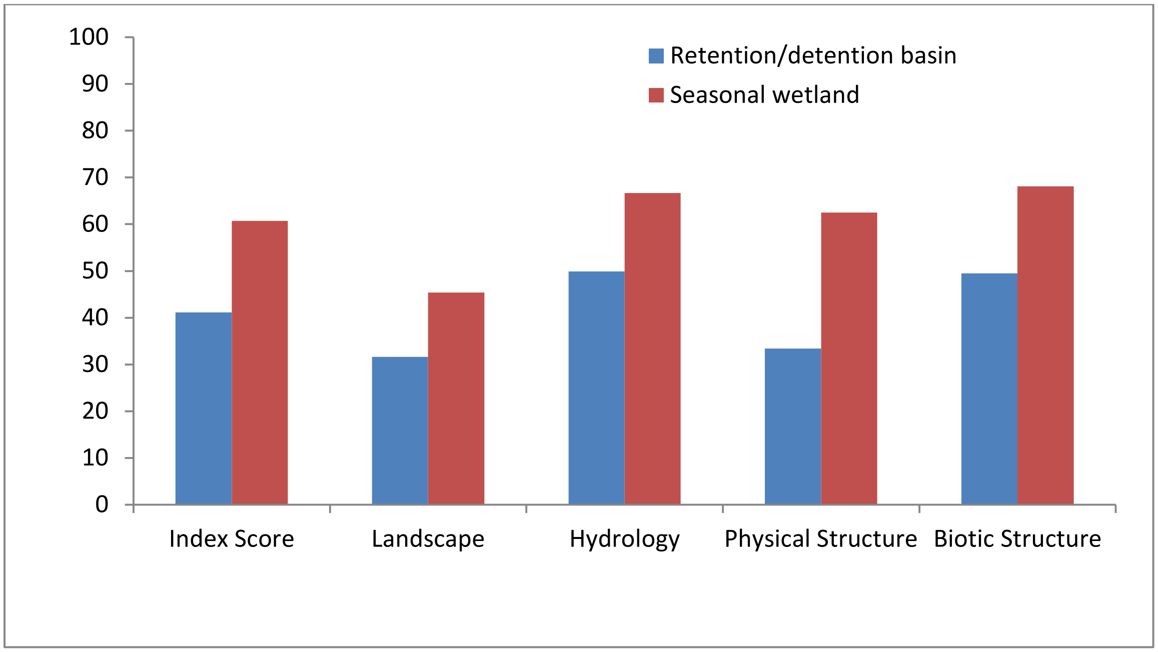

Figure 5-1
Average CRAM index scores and attribute scores for depressional wetland AAs

5.2 Riverine Wetlands

Seventeen AAs were assessed using the riverine module. These scores are based on the assessment of three canals, seven ditches, and seven seasonal riverine features. The ditches and canals were generally the lowest-scoring features assessed using the riverine module. The ditches and canals are located throughout the Fresno to Bakersfield study area. The majority are adjacent to agricultural fields and have hydrologic regimes controlled by weirs, gates, and pumping systems. Because of their landscape position, highly manipulated hydrologic regime, and lack physical and structural complexity, AAs of ditches and canals generally received relatively low Index scores and attribute scores. Three exceptions are ditches in the Allensworth area that are surrounded by a relatively natural vernal pool landscape and are not used for agricultural purposes.

AAs along the Kings River, Poso Creek, Cross Creek, and Kern River were selected to assess seasonal riverine features within the Fresno to Bakersfield study area. Overall, the Index scores

for these AAs were similar though attribute scores for the AAs along the Kings River were generally higher than those of the other AAs, and attribute scores for Poso Creek were generally lower than those of the other AAs. The AA along Cross Creek scored relatively high overall, though individual attribute scores were within the ranges of those of the other riverine AAs. The lowest Index score for a seasonal riverine AA was along the Kern River where evidence of severe aggradation and little structural patch richness resulted in low Hydrology and Physical Structure Attribute scores.

Figure 5-2 shows the average CRAM index scores for SAR wetland types evaluated using the riverine module.

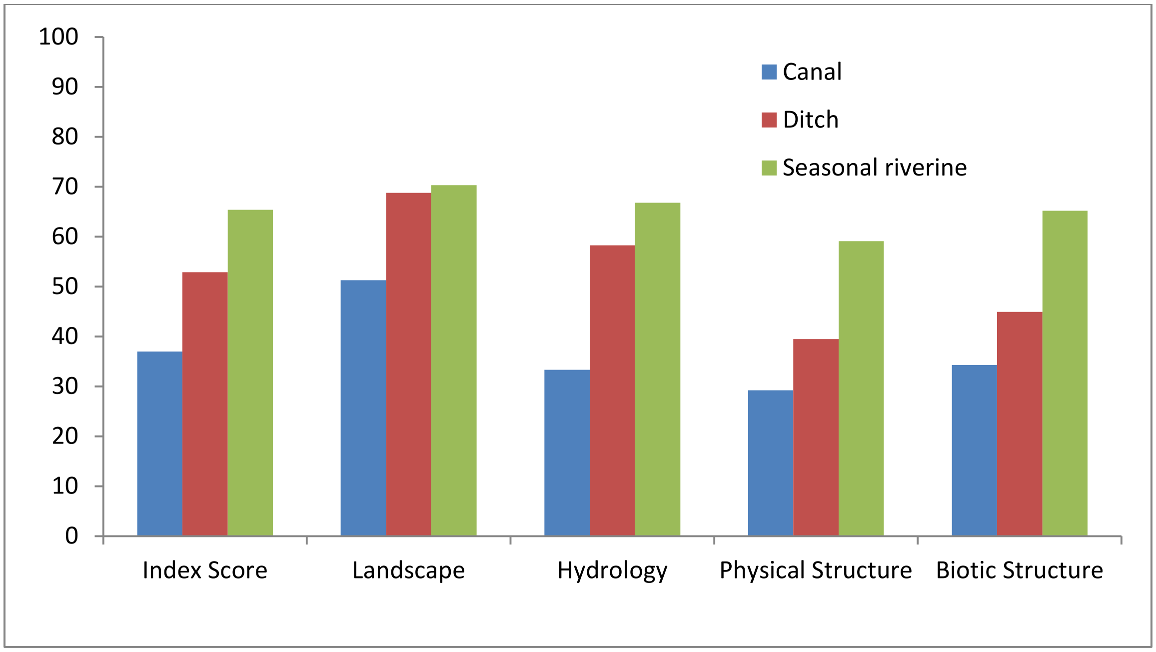

Figure 5-2
Average CRAM index scores and attribute scores for riverine wetland AAs

5.3 Individual Vernal Pools

Eleven AAs in vernal pools were assessed using the individual vernal pool module. All of these AAs occurred in the Allensworth area, either west of the town of Allensworth or near the Allensworth Ecological Reserve and BNSF railway. The AAs west of Allensworth (Appendix B, V70-V76D) scored lower than those near the Allensworth Ecological Reserve (Appendix B, V62A, V65, and V104-V115A) due to the proximity to habitat disturbed by surrounding dry land farming, compacted soils, and the dumping of refuse. Comparatively, vernal pools near the Allensworth Ecological Reserve are surrounded by relatively undisturbed natural lands and are dominated by native vegetation. All AAs in vernal pools received relatively high scores for the Hydrology Attribute, because the majority of the vernal pools assessed were away from berms, groundwater pumping systems, and agricultural canals and ditches. Scores for Physical Structure tended to be lower than other attribute scores, as a result of a lack of structural patch richness and a lack of topographic complexity.

Figure 5-3 shows the average CRAM index scores for individual vernal pool AAs.

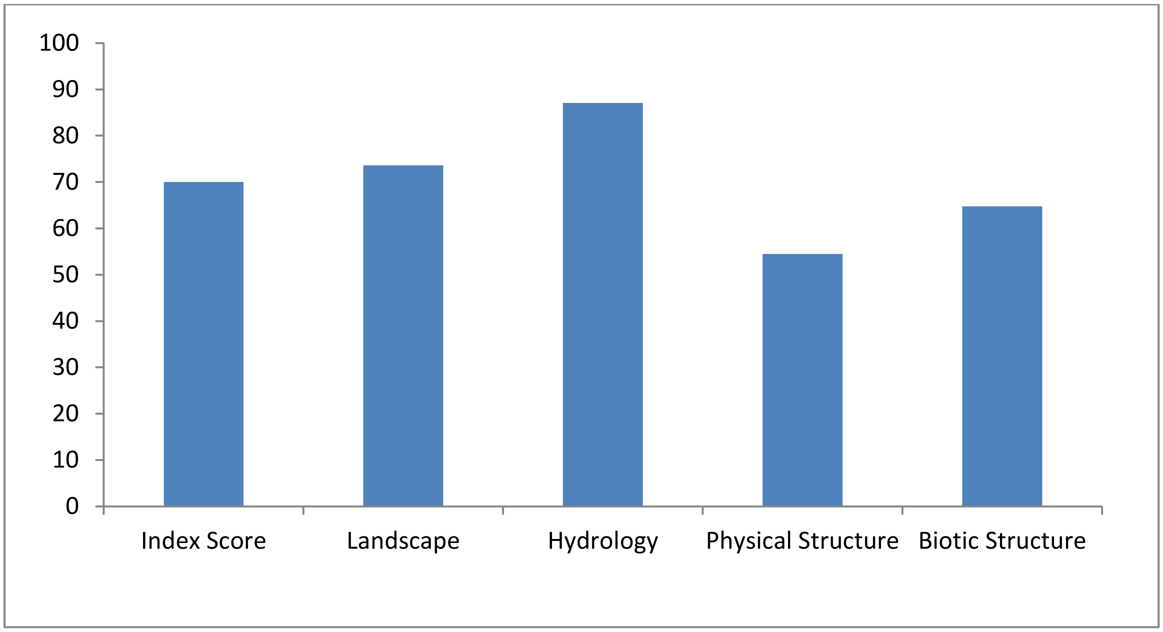

Figure 5-3
Average CRAM index score and attribute scores for individual vernal pool AAs

5.4 Vernal Pool Systems

Six AAs were assessed using the vernal pool systems module. All of these AAs occurred in the Allensworth area. These AAs consistently scored relatively high, with the highest-scoring AA receiving an overall score of 82.7. The high scores are indicative of the fact that the surrounding natural landscape is composed of a network of wetlands that is less disturbed than the rest of the Fresno to Bakersfield study area. All of the AAs scored high on the Buffer and Landscape Context and Hydrology Attributes. Scores for the Physical Structure Attribute varied, which was due to the varied degree of topographic complexity observed in each vernal pool system. Scores were typically lowest for the Biotic Structure Attribute because of a general lack of dominant endemic vernal pool vegetation.

Figure 5-4 shows the average CRAM index scores for vernal pool systems AAs.

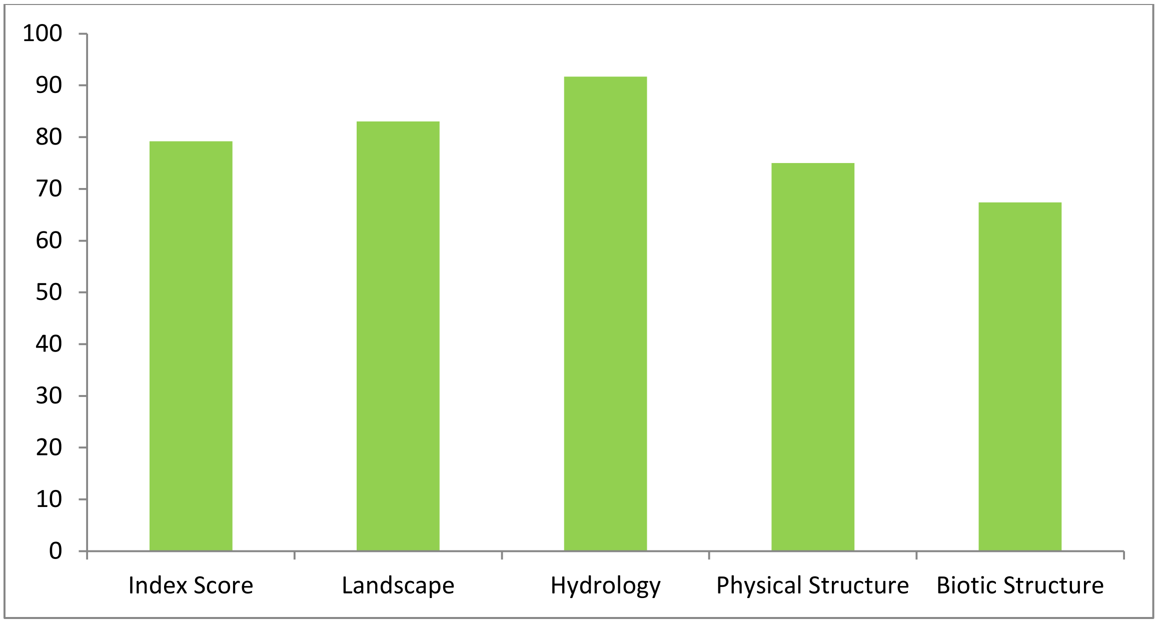

Figure 5-4
Average CRAM index score and attribute scores for vernal pool systems AAs

5.5 Fresno to Bakersfield CRAM Stressors

Appendix E lists the stressors influencing the AAs evaluated for Fresno to Bakersfield. The most common stressor within the Buffer and Landscape Attribute was the negative effect of a transportation corridor within 500 meters of AAs. Generally, the transportation corridor closest to the AAs was the BNSF railroad and SR 43 corridor. The most common stressor for the Hydrology Attribute was the negative influence of a dike/levee within 50 meters, which was typically the berm associated with BNSF and SR 43. Grading/compaction was the most common stressor within the Physical Structure Attribute and can generally be attributed to grading for agricultural purposes. Pesticide application or vector control was the most common stressor within the Biotic Structure Attribute, resulting from the proximity of AAs to row crops and orchards to which pesticides are applied.

The stressors can also be compared by CRAM wetland type. For depressional wetlands, the most common stressor was pesticide application/vector control, due to the hydrologic connection between agricultural fields and retention/detention basins and the opportunity for chemicals to flow into the basins. The presence of dikes/levees, orchards/nurseries, and a transportation corridor were most common for all riverine AAs (including canals, ditches and seasonal riverine). No difference was found in the stressors on canals and ditches versus seasonal riverine features. For vernal pools and vernal pool systems, the most common stressors were the presence of dikes/levees and a transportation corridor. Grading/compaction was also common for individual vernal pools.

5.6 Potential Mitigation Sites

A summary of the CRAM scores for each potential mitigation site is presented in Table 5.6-1. Eighteen AAs were evaluated across the seven properties. The CRAM scores of AAs within these sites ranged from 57.7 to 81.2. The CRAM results for each site are detailed in this section along with descriptions of the stressors influencing the AAs.

Table 5-2
CRAM Results for Mitigation Sites

Location	CRAM Type	Number of AAs	Average Index Score	Average Attribute Scores			
				Buffer and Landscape Context	Hydrology	Physical Structure	Biotic Structure
Buena Vista Dairy	Depressional Wetland	2	70.7	87.1	83.3	50	62.5
	Individual Vernal Pool	1	75.4	93.3	91.7	62.5	54.2
	Vernal Pool System	2	81.2	93.3	91.7	75	64.6
Davis	Seasonal Depressional Wetland	2	69.7	84.0	83.3	37.5	73.6
Staffel	Individual Vernal Pool	2	73.9	93.3	91.7	43.8	66.7
Te Velde	Riverine	2	57.9	67.7	66.7	37.5	60.3
Valadez	Depressional Wetlands	1	58.5	47.9	66.7	50	69.4
	Individual Vernal Pool	1	57.7	55.8	100	37.5	37.5
Yang	Vernal Pool System	3	81.0	93.3	91.7	75	63.9
Clark River Ranch	Riverine	2	59.8	68.8	62.5	43.8	63.9

Acronyms:
AA assessment area
CRAM California Rapid Assessment Method

5.6.1 Buena Vista Dairy

Buena Vista Dairy is a 715-acre property in Kern County, predominantly composed of undisturbed land supporting vernal pools, swales, and remnant riverine wetlands. Five AAs were evaluated on the Buena Vista Dairy property: two depressional wetlands, one individual vernal pool, and two vernal pool systems. All five of these AAs are representative of the wetland features present on the property. The depressional wetlands are part of a remnant channel that no longer functions as a flow-through system because of a restrictive berm downstream of the AAs. These two AAs received nearly identical scores. Due to lack of physical and biotic diversity and the presence of a non-native invasive plant species, both AAs scored relatively low on the Physical Structure and Biotic Structure Attributes, compared to their scores for the Buffer and Landscape and Hydrology Attributes. The individual vernal pool AA scored relatively high on Buffer and Landscape, and Hydrology Attributes due to a continuous, wide buffer and natural hydrology. It scored lower on the Physical Structure Attribute as a result of moderate structural patch richness. It scored lowest on Biotic Structure due to a lack of endemic vernal pool species in the AA. Of the AAs evaluated

on the property, the two vernal pool system AAs scored the highest, scoring relatively high for all attributes except Biotic Structure. Like the individual vernal pool AA, no endemic vernal pool species were identified in these AAs lowering the Biotic Structure score.

Appendix E lists the stressors influencing the AAs evaluated at the Buena Vista Dairy as well as the rest of the potential mitigation sites. The stressor influencing the depressional wetland AAs on the Buena Vista Dairy within the Buffer and Landscape Attribute was intensive row crop activities on the adjacent property. The Interstate 5 and Route 119 transportation corridors were the stressors that had the greatest influence on the individual vernal pool and vernal pool system AAs. All of the AAs were negatively influenced by the dike/levee within 50 meters (under the Hydrology Attribute), which blocked the flow of the historic channel through the property. No stressors within the Physical or Biotic Structure Attributes were identified for any of the AAs on the Buena Vista Dairy property.

Figure 5-5 shows the average CRAM index scores and attribute scores for the five AAs evaluated on the Buena Vista Dairy property, broken down by CRAM wetland type.

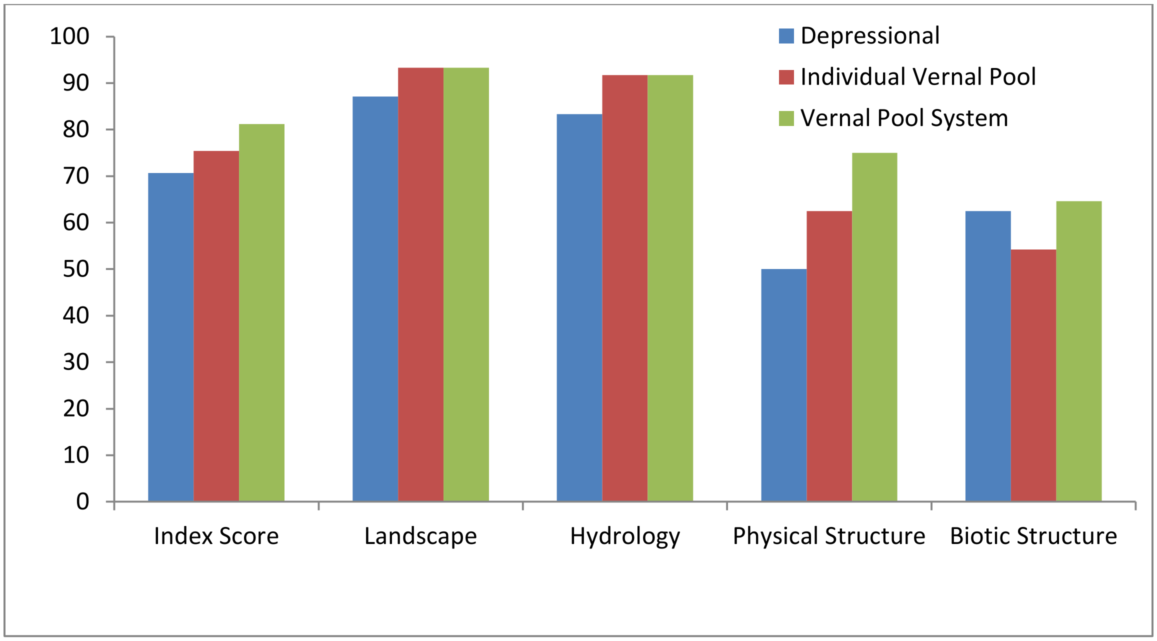

Figure 5-5
Average CRAM index score and attribute scores for AAs on Buena Vista Dairy

5.6.2 Davis

The Davis property is a 158-acre parcel containing predominantly undisturbed land in Kern County. A large vernal swale extends from the northeast region of the property to the southwest corner and seasonal depressional wetlands are present along the western edge of the parcel. Two of these seasonal wetlands were assessed using the CRAM depressional module. Both AAs occur in the northwestern portion of the property. The AAs received similar CRAM index scores and received identical scores for the Buffer and Landscape Context, Hydrology, and Physical Structure Attributes. The site is relatively undisturbed and the presence of a wide buffer in good condition and the natural hydrology resulted in high scores for the Buffer and Landscape Context and Hydrology Attributes. Among the attributes, the AAs scored lowest on Physical Structure. Both structural patch richness and topographic complexity were lacking in these wetlands. This was characteristic of other wetlands identified on the property. Differing degrees of horizontal

interspersion and zonation in the two AAs provided variation in the scores for the Biotic Structure Attribute.

The stressors influencing the AAs on the Davis property were within the Buffer and Landscape Context and Hydrology Attributes. The transportation corridor (Corcoran Road) supports enough traffic to negatively affect the AAs. Additionally, evidence of passive recreation (foot trails) indicates potential for a negative effect from human use. Within the Hydrology Attribute, the AAs were negatively influenced by flow obstructions from the presence of a culvert directing flows beneath Corcoran Road. No stressors were identified within the Physical and Biotic Structure Attributes.

Figure 5-6 shows the average CRAM index score and attribute scores for the two seasonal depressional wetland AAs evaluated on the Davis property.

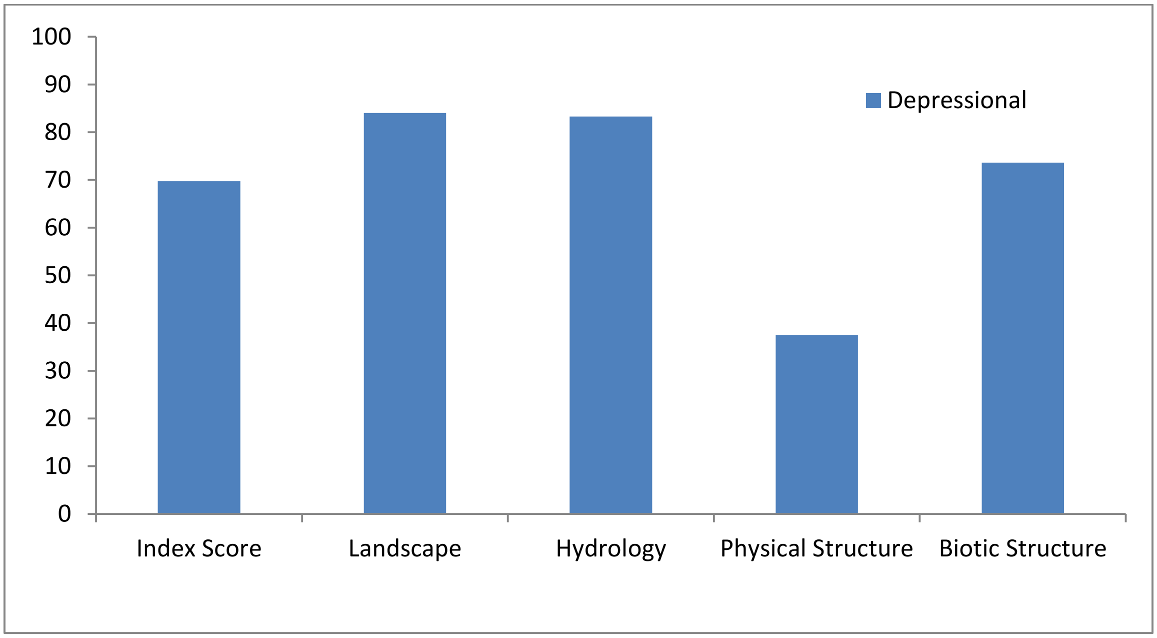

Figure 5-6
Average CRAM index score and attribute scores for AAs on the Davis property

5.6.3 Staffel

The Staffel property is a 61-acre parcel in Kings County, immediately south of the Allensworth Ecological Reserve. The land is predominantly undisturbed and supports vernal pools in the northern portion of the property and as well as small scattered depressional seasonal wetlands. The vernal pools are part of a larger vernal pool network that extends offsite, receiving surface flow from the Allensworth Ecological Reserve that enters at the northern boundary of the Staffel property. Two large individual vernal pool AAs were evaluated at the Staffel property. These AAs are representative of vernal pools present throughout the property. The site is relatively undisturbed and both AAs scored high on Buffer and Landscape Context and Hydrology Attributes because of the continuous, wide buffers and natural hydrology. Both AAs scored lowest on the Physical Structure Attribute. Both structural patch richness and topographic complexity were lacking in these vernal pools. This was characteristic of other vernal pools identified on the property. One vernal pool AA scored relatively low on the Biotic Structure Attribute due to little horizontal interspersion and zonation. The other AA received a moderately high Biotic Structure Attribute score because it had a large number of co-dominant plant species. Neither AA contained endemic vernal pool species.

The stressors influencing the AAs on the Staffel property were within the Buffer and Landscape Context and Physical Structure Attributes. The presence of orchards/nurseries on parcels south of the Staffel property potentially has a negative effect on the AAs. Additionally, the presence of trash/refuse, including plastic buckets, oil drums, and discarded appliances and furniture may negatively affect the physical structure of the vernal pools. No stressors were identified within the Hydrology and Biotic Structure Attributes.

Figure 5-7 shows the average CRAM index score and attribute scores for the two individual vernal pool AAs evaluated on the Staffel property.

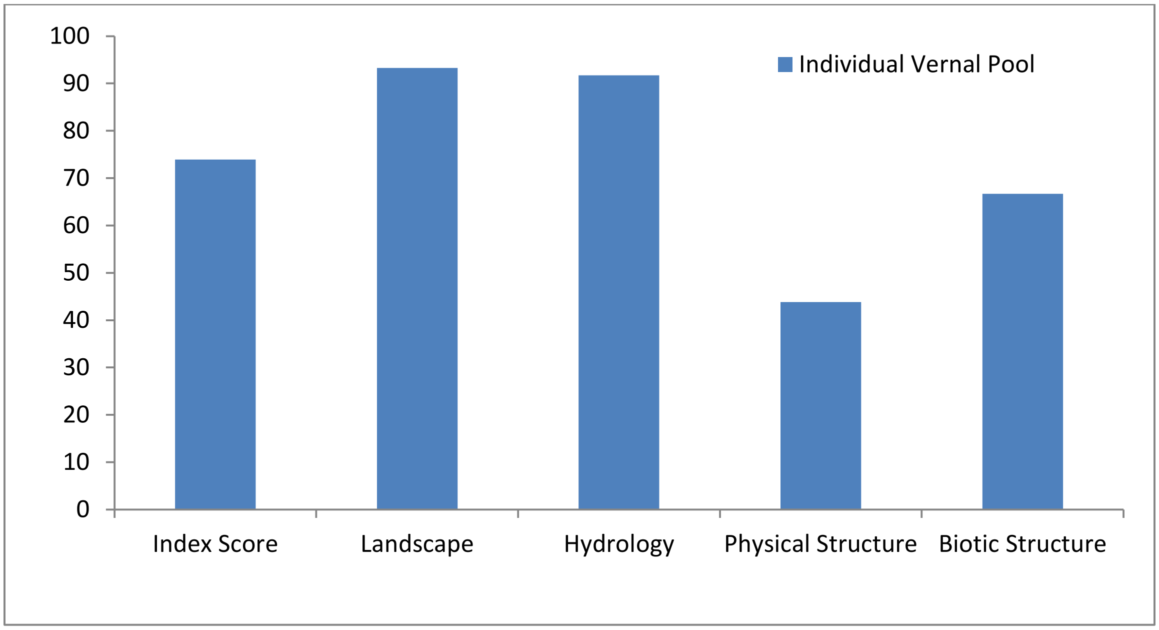

Figure 5-7
Average CRAM index score and attribute scores for AAs on the Staffel property

5.6.4 Te Velde

The Te Velde property consists of eight parcels on 1,356 acres in Tulare County. The parcels are in active agricultural use. The Tule River flows across the property from the east, bisecting the site, and forks before reaching the southwest corner. Two riverine AAs were evaluated along the Tule River on the Te Velde Property. Because this portion of the Tule River is bounded on both sides by roads atop berms and is surrounded by agricultural fields, both AAs received moderate scores for the Buffer and Landscape Context Attribute. Hydrologic connectivity was the metric that most influenced scores for the Hydrology Attribute, with one AA scoring relatively high and the other relatively low. Both AAs scored relatively low on the Physical Structure Attribute. Structural patch richness and topographic complexity were lacking within this portion of the Tule River. The presence of non-native invasive plant species and low vertical biotic structure resulted in relatively low Biotic Structure Attribute scores for both AAs. These AAs are representative of the segment of the Tule River that runs through the Te Velde property.

The stressor influencing the AAs on the Te Velde property within the Buffer and Landscape Context was ranching, from the onsite ranch south of the river. Within the Hydrology Attribute, non-point source discharges from agricultural activities immediately adjacent to the AAs and flow diversions from culverts were identified as stressors negatively influencing the AAs. Within the Physical Structure Attribute, grading/compaction and plowing/discing were also identified. Additionally, the AAs were identified as bacteria- and pathogen- impaired based on visible

watering of livestock waste piles adjacent to the Tule River. No stressors were identified within the Biotic Structure Attribute.

Figure 5-8 shows the average CRAM index score and attribute scores for the two seasonal riverine AAs evaluated on the Te Velde property.

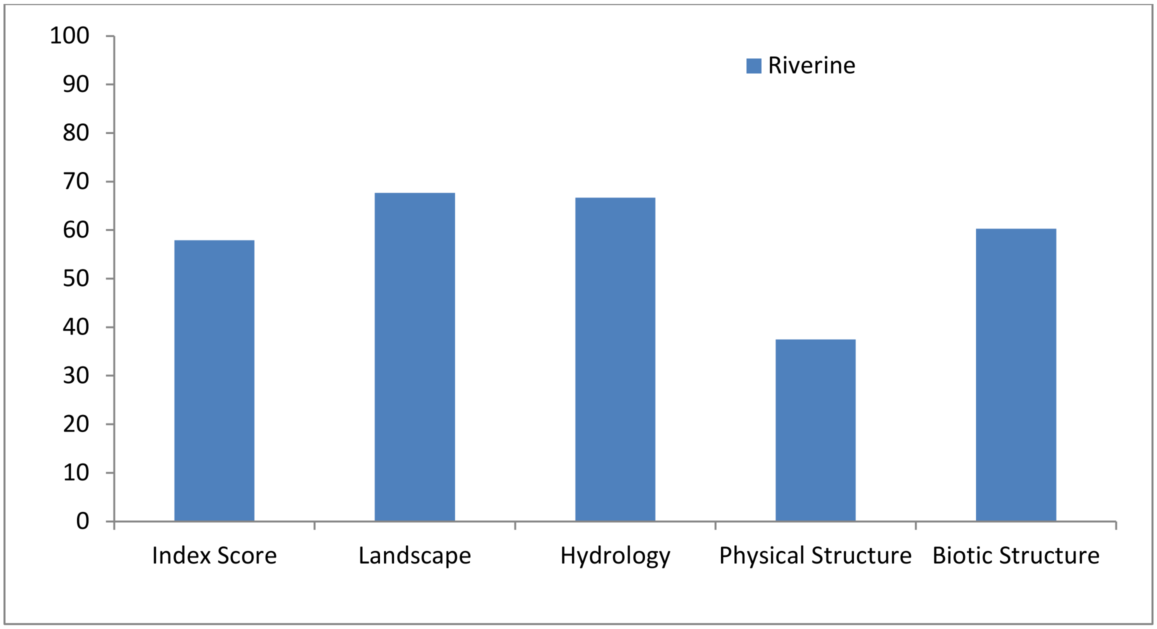

Figure 5-8
Average CRAM index score and attribute scores for AAs on the Te Velde property

5.6.5 Valadez

The Valadez property is a 120-acre parcel of moderately disturbed land featuring a man-made wetland basin, and vernal pools that are located in the northern portion of the site. Two AAs were evaluated on the Valadez property: one depressional wetland and one individual vernal pool. The depressional wetland AA was in the large, deep, man-made basin that appears to no longer be used for any water-holding/infiltration purposes. The basin now functions as a vegetated wetland with upland islands. This AA received a relatively low index score and low attribute scores because of disturbed site conditions, the man-made nature of the feature, and little physical and biotic diversity. The individual vernal pool AA also received a relatively low index score and low attribute scores, resulting from a disturbed landscape and little physical and biotic diversity. The exception was the Hydrology Attribute, for which the AA received a score of 100. Despite disturbed site conditions, the AA showed evidence of a natural hydrology regime.

The stressors influencing the AAs on the Valadez property differed somewhat between the two AAs. The stressors influencing the depressional wetland were urban/residential (from the onsite residential and operational facilities) and grading/compaction of the land adjacent to the wetland. These stressors are within the Buffer and Landscape Context and Physical Structure Attributes, respectively. The transportation corridor of Corcoran Road was identified as negatively affecting both AAs. No other stressors were observed for the individual vernal pool AA and no stressors within the Biotic Structure Attribute were identified.

Figure 5-9 shows the average CRAM index scores and attribute scores for the depressional wetland and the individual vernal pool AAs evaluated on the Valadez property.

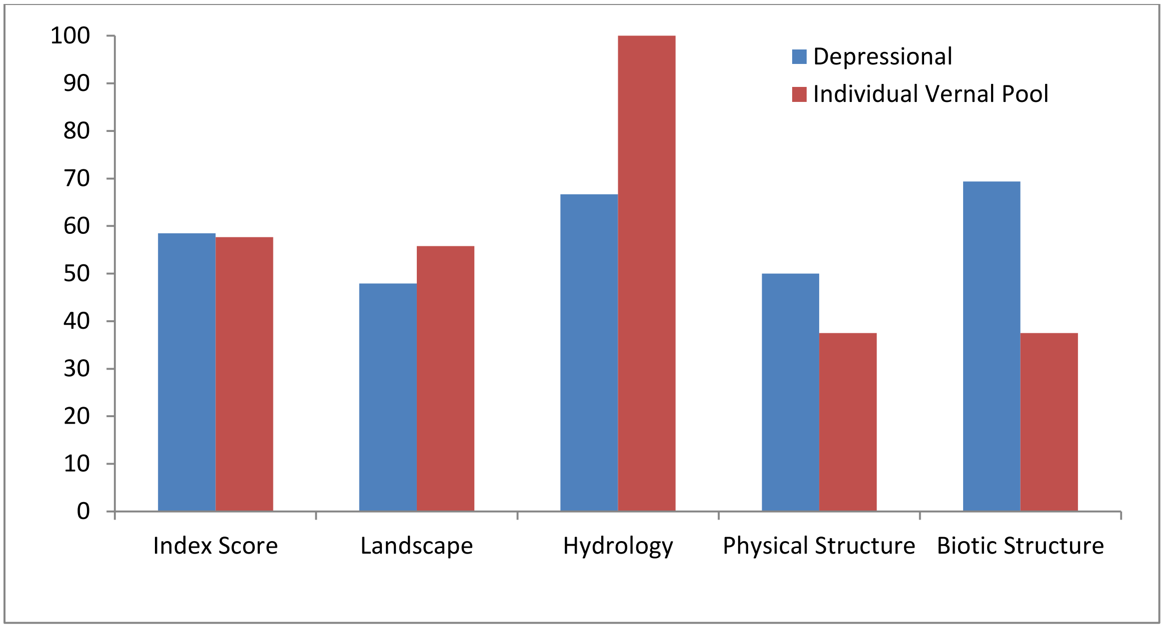

Figure 5-9
Average CRAM index score and attribute scores for AAs on the Valadez property

5.6.6 Yang

The Yang property is composed of 316 acres on eight parcels in Kings County and is bordered by the Allensworth Ecological Reserve to the east. The land is predominantly undisturbed and a large, continuous network of vernal pools and swales extends from the Allensworth Ecological Reserve west onto the Yang property. Three vernal pool system AAs were evaluated on the Yang property. All three received relatively high index scores and are representative of vernal pool systems on the property. The natural conditions of the site and surrounding landscape resulted in relatively high scores for the Buffer and Landscape Context and Hydrology Attributes for all three AAs. Although pool and swale density were high, a lack of abundant structural patch richness and topography complexity resulted in lower scores for the Physical Structure Attribute in all three AAs. The Biotic Structure Attribute received the lowest scores. This was primarily due to a high percentage of non-native species present in the vernal pools and a lack of endemic vernal pool species.

Only one stressor was identified as negatively affecting the three AAs on the Yang property: the presence of orchards/nurseries within 500 meters of the property north of Yang. No CRAM stressors within the Hydrology, Biotic, or Physical Structure Attributes were observed.

Figure 5-10 shows the average CRAM index score and attribute scores for the three vernal pool system AAs evaluated on the Yang property.

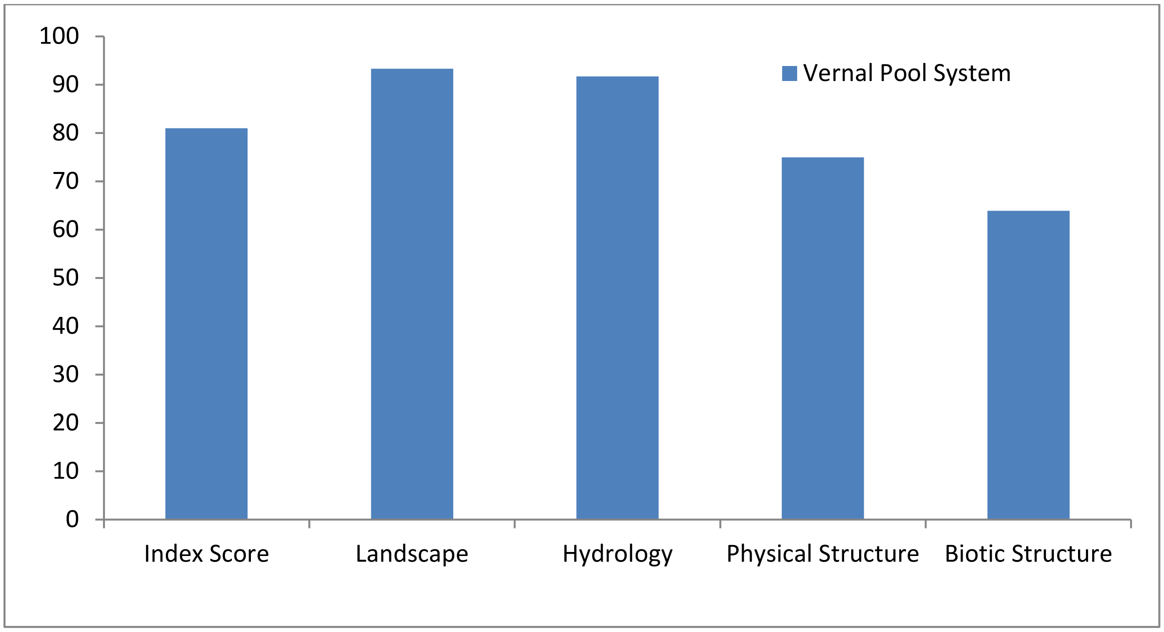

Figure 5-10
Average CRAM index score and attribute scores for AAs on the Yang property

5.6.7 Clark River Ranch

Clark River Ranch is composed of approximately 290 acres on 110 parcels at the divergence of the northern and southern forks of the Kings River in Kings County. The parcels include a combination of active irrigated and fallow agricultural fields surrounded by intact and degraded riparian and woodland habitats. Two riverine AAs were evaluated along branches of the Kings River. One of the AAs (R401) is along the Clarks Fork of the Kings River at the southern end of Clark River Ranch. The other AA (R402) is along the northern fork of the Kings River at the northern end of Clark River Ranch.

The two riverine AAs received similar overall scores. Because both forks of the Kings River are bounded by road berms and surrounded by agriculture, which has created narrow buffers, both AAs received moderate scores for the Buffer and Landscape Context Attribute. AA R402 received a lower score than R401 for this attribute because it has a wide gap in the riparian corridor upstream of the AA. Both AAs scored lower on the Hydrology Attribute due to regulated releases of water through dams upstream of the AAs and low entrenchment ratios. Both AAs scored relatively low in Physical Structure because they lacked structural patch richness and topographic complexity. R401 scored relatively low on Biotic Structure due to low horizontal interspersion and vertical biotic structure. R402 received a moderate score due to greater horizontal interspersion and vertical biotic structure.

The stressors influencing the AAs at Clark River Ranch within the Buffer and Landscape Context were the dams upstream within 500 meters and intensive row-crop agriculture and orchards on Clark River Ranch and surrounding properties. Within the Hydrology Attribute, dike/levees and

actively managed hydrology were identified as stressors on both AAs. Within the Physical Structure Attribute, plowing/discing and excessive sediment from the watershed were identified as stressors on both AAs. No stressors within the Biotic Structure Attribute were identified for either AA.

Figure 5-11 shows the average CRAM index score and attribute scores for the two riverine AAs evaluated on the Clark River Ranch property.

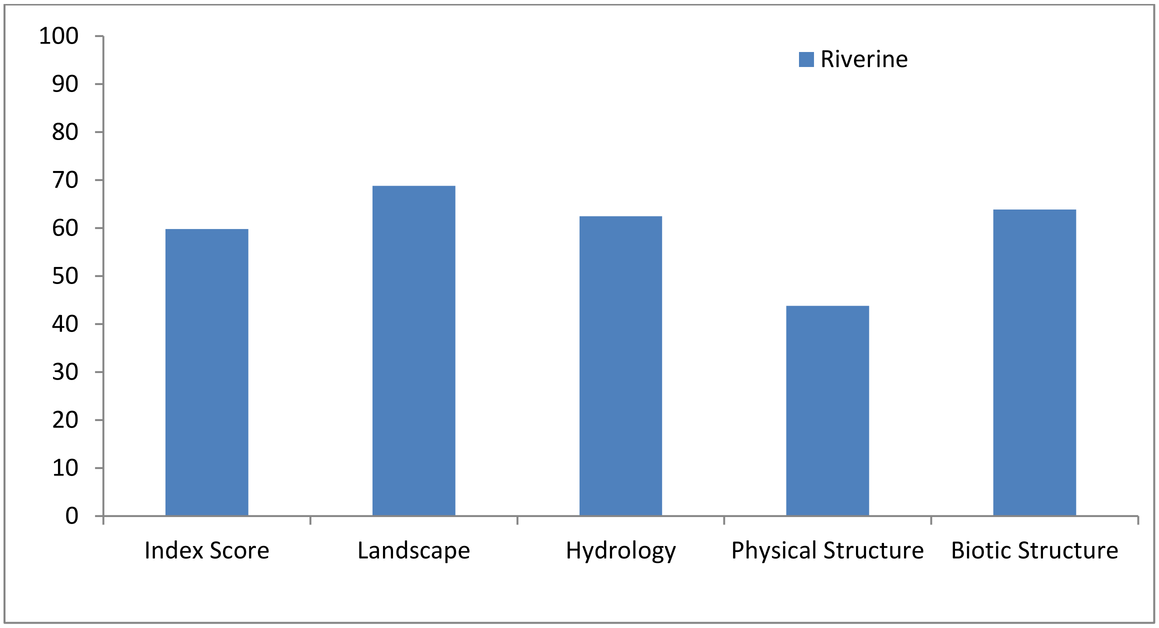

Figure 5-11
Average CRAM index score and attribute scores for AAs on the Clark River Ranch property

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Section 6.0
Discussion

6.0 Discussion

This section discusses the sampling and methodological considerations in using CRAM for the Fresno to Bakersfield Section of HST and in using CRAM to evaluate watershed condition. This section also provides some discussion on the effects of stressors on CRAM scores and using CRAM to extrapolate existing conditions for all the aquatic features in the study area. A brief summary is also included on how CRAM was used to evaluate the potential mitigation sites.

6.1 Consistency with CRAM Requirements and Implementation Guidelines

A concern that arises in conducting CRAM studies is deviation from the specified technical approaches identified in the CRAM guidance. With the guidance of the CRAM coordinator, Chad Roberts, the field portion of this study was conducted in accordance with published CRAM technical requirements except as indicated below. The results reported in this document stem from a valid application of CRAM.

6.1.1 Sample Frame and Sample Size

A primary concern for this CRAM application arises as a consequence of the distributed nature of wetlands and aquatic areas within the project alignment and the need to ensure an adequate sample frame for the AAs in each module. A second, related concern stems from the size of the CRAM sample (i.e., the numbers of AAs) for each module.

The CRAM manual recommends a process for establishing a project-based sampling protocol to: (1) establish a separate map of the study area showing all of the aquatic features of each wetland type (the *sample frame* for that type); (2) identify possible AAs within each sample frame for the study area; and (3) sample AAs and consider the scores, with sampling continuing until the ranges in Index and Attribute scores are small enough to conclude that the results accurately describe the real variation in condition in each sample frame.

For the Fresno to Bakersfield Section, the sample frames (the set of wetlands of each type from which the sample of AAs is drawn) were determined jointly by (1) the locations of aquatic features of each type within a given distance of the project alignment and (2) the team's permission to access the features. It is an unavoidable consequence of the arrangement of aquatic features that the combination of proximity and permission resulted in a limitation in the locations and numbers of AAs that could be sampled.

The sample frames for aquatic features (Table 5-1) were 8 (combined) for depressional features, 17 (combined) for riverine features, 11 for individual vernal pools, and 6 for vernal pool systems. The project team made an effort to distribute the AAs in each module throughout the project alignment between Fresno and Bakersfield according to the sample frame; that is, to sample the aquatic features where they occurred throughout the study area to ensure that the range of variability in these features was captured in the results.

In general, the locations for depressional sites and riverine sites indicate a broad sample frame within the study area. The CRAM coordinator determined that a relatively small sample size was required for depressional features because the vast majority of depressional features in the project alignment were either (1) irrigation reservoirs related to agricultural operations that exhibited limited variation in site conditions everywhere in the study area, or (2) stormwater retention/detention basins in developed areas. Similarly, many "riverine" sites were ditches and canals associated with agricultural operations and/or flood conveyance, features that exhibit limited variability throughout the project alignment. These agricultural- and urbanization-related

features did not exhibit sufficient variation in condition to warrant large sample sizes, even if the opportunity were presented to sample large numbers of such features. This result is fully consistent with CRAM implementation guidance.

The sample frame for "natural" riverine features in the project alignment was, however, limited by the combination of limited presence in the alignment and lack of access permission. Additional assessments of "natural" riverine features would have been desirable, but opportunities for such assessments did not exist given the exigencies of the project. Nonetheless, the team was able to secure assessment scores for seven natural riverine features from the entire alignment. In the end, the CRAM coordinator judged that the sample size for these features reflected the average condition of such features within the alignment.

The sample frame for vernal pool features (both individual pools and vernal pool systems) in the project alignment was highly constrained geographically; generally these features have been obliterated through much of the alignment by agricultural conversions. Paradoxically, where the features can still be found (e.g., in the Allensworth area) they are relatively common, and an adequate sample size was obtained within the project vicinity.

In general summary, the application of the CRAM methodology to the project was consistent with the recommendations in the CRAM manual for sample frame and sample size.

6.1.2 Methodological Considerations

A minor deviation from then-existing CRAM methodology occurred in conducting two riverine assessments on the Kern River. AAs were established along the southern bank of the Kern River. At the time of the assessments, the depth of water flowing in the river was too deep to be wadable and the riverbed was unstable. Under the direction of the CRAM coordinator, the AA was positioned along one bank and an electronic distance-measuring device was used to measure the bankful width and flood-prone width, the two variables required to assess the "entrenchment ratio" in the riverine module's Hydrological Connectivity metric. This approach was subsequently incorporated into the riverine module, and the approach adopted for this project is now accepted in similar CRAM contexts. No other substantial methodological variations occurred for riverine module applications covered by this report.

The season of applicability for the depressional wetland module is the "growing season" for wetland vegetation, generally considered in CRAM to be March to September in areas not subject to snowmelt. However, even though the Fresno to Bakersfield Section was assessed in September and in March (both within the nominal "growing season"), at the time of the assessments the area already showed signs of severely dry conditions, and "natural" depressional areas (as opposed to irrigation ponds) exhibited reduced vegetative growth that likely affected Biotic Structure Attribute scores. However, this factor (drought during the growing season) is considered to be an element of natural variation within the study area, rather than a variation from CRAM methodology, and no substantial methodological variations occurred for the depressional wetland module applications covered by this report.

The vernal pool assessments reported in this document were conducted in September, which was (and remains) outside the period recommended for vernal pool module assessments (essentially the spring, approximately March to June). While many of the metrics in the vernal pool modules can be assessed outside of the spring season, the presence and dominance of vernal pool-endemic plant species is constrained seasonally. In addition, seasonal drought reduces the percent cover for all vegetation. Both results affect the Biotic Structure Attribute scores in both vernal pool modules. The vegetation conditions in September required that team botanists identify the dried remnants of vernal pool-endemic plants based on prior familiarity with these

pools in wetter seasons. Early vernal pool assessments were used to train other members in the field team in recognizing the remains of endemic species.

This identification of vernal pool endemics on the basis of dried remnants is loosely termed "forensic vernal pool botany" in CRAM contexts, and while it is appropriate to identify the applicability of vernal pool modules, it is not recommended for standard use because evidence exists that this variant in the methodology does not fully identify a complete complement of vernal pool species that would be identified at the appropriate season. This is expected to have occurred within the study area even though the abundance of vernal pool-endemic plant species is lower in the Tulare Lake region than in other parts of the Central Valley.

Therefore, the conclusion should be reached that the application of CRAM to the vernal pools in the study area most likely resulted in identifying fewer vernal pool-endemic plant species than would have been identified with assessments during the spring. Out-of-season assessments may also have resulted in underscoring vegetation mosaic complexity (now termed "Horizontal Interspersion"). Such results would likely be reflected by lower Biotic Structure Attribute scores for vernal pools than would occur with springtime assessments. However, the other aspects of the application of the vernal pool modules were executed according to CRAM guidance, and scores in general are expected to reflect appropriate ranking among the pools assessed. (In addition, it should be noted that the drought conditions in the study area during the winter and spring of 2011–2012 did not result in the development of "normal" vernal pool vegetation in the spring of 2012, and the assessment of vernal pool conditions in the study area would have been affected in any event.)

6.2 Watershed Condition

The arrays of CRAM scores reported in Section 5.0 provide a snapshot of watershed condition in the vicinity of the HST alignment between Fresno and Bakersfield. Table 5-1 presents the relevant CRAM index and attribute scores for features assessed, by feature subtype.

6.2.1 Depressional Sites

Depressional sites identified in the study area were fundamentally of two types. The first type was agricultural irrigation reservoirs. These features yielded very low CRAM scores, which reflects the fact that these are created features that function in conjunction with canals and ditches in rather unnatural "watersheds." These reservoirs are largely temporary groundwater storage facilities, which function hydrologically as the sources of water (and often as the sources of hydrostatic pressure) for the agricultural irrigation systems of which they are elements; they are highly dynamic, with evidence in some reservoirs of significant fluctuations in water surface elevation over short time periods, and have little vegetation. Fundamentally, they are not part of the remnant watersheds in the study area except to the extent that they provide water that may flow in the canal/ditch systems that still retain remnant "watershed" characteristics (e.g., drainage networks that convey rainfall to a watershed low point, generally the Tulare Lake bed) in the study area. Little condition variation was observed among these features anywhere in the Fresno to Bakersfield Section.

The second type of depressional wetland area identified in the project region was detention/retention basins that function as part of local stormwater management systems. Such features were largely restricted to developed parts of the project alignment. These depressions are typically better vegetated but less hydrologically connected than are the agricultural reservoirs (that is, the primary goal of such features is *not* to release water to regional drainage systems), but they also had low CRAM scores that reflect low importance to study area watersheds.

These two types of depressional wetlands are indicative of study area watersheds that have substantially altered land uses and hydrology. The low CRAM scores indicate that these watershed elements do not have a high condition status and provide few of the functions that would be expected from depressional wetlands in less-altered watersheds.

Natural depressional wetlands in the Fresno to Bakersfield Section are rare, apparently occurring primarily as a consequence of past fragmentation and isolation of more natural aquatic features, although some of the shallow natural wetlands in the Allensworth region may be depressional wetlands and are not uncommon in that context. As indicated by the CRAM scores of two "natural" depressional wetlands near Hanford (apparently relicts of a former riverine feature, probably a distributary of the Kings River), such remnants tend to provide better condition indicators, exhibited by CRAM scores that are significantly higher than those of the created features.

6.2.2 Riverine Sites

The conditions presented by canals and ditches are assessed in CRAM using the riverine module, which allows a comparison of conditions in such features with respect to remnant natural riverine features in the study area. The canals and ditches assessed throughout the Fresno to Bakersfield Section (with two exceptions; see below) yielded scores that were substantially (approximately 20 CRAM points) lower than the scores for remnant natural riverine systems in the project vicinity (which included the channels of the Kern River, Poso Creek, Cross Creek, and the Kings River). The CRAM scores for the canals and ditches assessed in the study area indicate that these surface water features also do not provide many of the desired conditions found in natural riverine systems for study area watersheds.

Functionally, the canals and ditches form an alternative hydrological network in lieu of the more natural drainage system that existed before the commitment of virtually all of the study area to agriculture. In a large sense the conversion has included even the remnant natural water features. All of the natural channels assessed in this study were clearly used as conveyances for artificial (mostly irrigation) water flow, as well as having more natural functions such as conveying runoff. At the same time, many of the larger canals in the study area showed indications that they function for conveying stormwater as well as for delivering irrigation flows.

The low condition scores for canals and ditches arise largely because of the artificiality of the constructed features in a context of highly modified watersheds. Two canals in Colonel Allensworth State Historic Park exhibited substantially higher CRAM scores than did the majority of artificial features in the Fresno to Bakersfield Section as a consequence of less-altered hydrological conditions in the State Historic Park. That is, these sites indicate that canals and ditches elsewhere in the study area provide low condition scores because of the regional alteration of watershed patterns, not simply because they are canals and ditches.

While the condition scores for the remnant natural features in the project alignment are higher than those of most canals and ditches, it is noteworthy that even the scores of the natural riverine features are not high in comparison with scores from riverine features in less-altered parts of California (based on CRAM scores reviewed at www.cramwetlands.org; see Section 6.4 for a description of the internal standard in CRAM modules that enables inter-regional comparisons among wetlands in each type). The scores indicate that even the least-altered riverine features in the study area provide fewer benefits to aquatic systems than riverine features in less-disturbed parts of California.

6.2.3 Vernal Pool Sites

The CRAM scores for vernal pool wetlands are the highest scores for aquatic features within the Fresno to Bakersfield Section. This result is fully consistent with the occurrence of these wetlands in the least-fragmented remnant watersheds in the study area. The scores suggest that the watersheds in the Allensworth region continue to provide higher levels of various functions than do most of the altered watersheds elsewhere in the study area. The CRAM team did not locate aquatic features identifiable as vernal pools in parts of the project alignments that were not in the Allensworth region (vernal pool features nevertheless may exist elsewhere which were not identified as vernal pools). The team generally concluded that it was unreasonable to conclude that vernal pools were not historically widespread in the Tulare Lake basin, and that the scarcity of such features today can only be identified as a consequence of their elimination as part of the conversion of the regional landscape to agriculture.

The identified condition scores for vernal pool systems are uniformly higher than comparable scores for individual vernal pools. The CRAM team is uncertain why this pattern exists, given that individual pools were intermixed with vernal pool systems where vernal pools occurred.

The vernal pools in the Fresno to Bakersfield study area are largely lacking in structural patch richness and vernal pool endemic plant species, two metrics that play large roles in calculating the attribute scores for Physical Structure and Biotic Structure, respectively. While these metrics capture conditions of vernal pools in California, they do not seem to account for the unique functions of vernal pools in the study area, which are representative of vernal pools in this region of the Central Valley. Low scores for Physical and Biotic Structure may be indicative of the limitations of CRAM for assessing unique wetland communities.

6.2.4 Watershed Condition Summary from CRAM Results

While the CRAM assessments were confined to the vicinities of the HST project elements in the Fresno to Bakersfield Section, the resulting condition scores are sufficient to support the following general conclusions about the watersheds in which these elements occur.

- Prior land use changes in the study area (largely the conversion of the regional landscape for agricultural purposes) have altered virtually all of the aquatic area conditions that are assessed by CRAM. The altered conditions are evident in the low study area scores for depressional and riverine features in general, and are particularly evident for the constructed features (ditches, canals, and reservoirs) that currently represent dominant hydrological elements in the project vicinity.
- Remnant "natural" features in the study area (a number of riverine features, a small number of altered depressional features, and a geographically limited sample of relatively intact vernal pools) generally received higher condition scores than did the constructed features. The remnant features provide a set of core elements that may be used for enhancing wetland conditions in the project vicinity, even though there is clear evidence that many of the remnant features have been co-opted to serve as elements in the altered watershed hydrology.
- The absence of vernal pool features in most of the project alignment is incompatible with expected conditions in unaltered watersheds in the Central Valley, including the Tulare Lake basin, supporting the conclusion that the extent of watershed alteration in the project vicinity has been extensive.

- Given the extent of the prior watershed alterations and the associated reductions in condition scores, it is not clear whether the pre-agricultural configuration and aquatic conditions provided by study area watersheds can be characterized at the present time.

6.3 Effect of Stressors on CRAM Scores

In addition to calculating an overall condition score and attribute scores, CRAM includes a stressor checklist. A stressor is defined in the CRAM User's Manual as "an anthropogenic perturbation within a wetland or its setting that is likely to negatively impact the functional capacity of a CRAM Assessment Area" (CWMW 2012). The stressor checklist is used to account for low CRAM scores by identifying specific impacts on the landscape, hydrology, physical, or biotic structure of an AA. In some cases, a single stressor may be the primary cause of low-scoring conditions, though conditions are usually caused by interactions among multiple stressors (EPA 2002).

No strong correlation of CRAM scores and the number of stressors was found among the AAs assessed in the Fresno to Bakersfield Section. A weak correlation (-0.15) supports the assumption that AAs with lower CRAM scores are subjected to more stressors, although many low-scoring AAs had few stressors.

The CRAM team concluded that the low-scoring AAs in man-made features (canals, ditches, agricultural reservoirs, and detention basins) are a direct result of anthropogenic influences (i.e., these man-made features are the stressors for natural watershed conditions in the project area). However, when CRAM scores and the numbers of stressors for each AA are compared for natural features only, the correlation remains weak. The CRAM team concluded that the effects of stressors throughout the project area have overwhelmed the potential relationships among stressors and natural aquatic systems, as a consequence of the regional conversion of the land use pattern to one completely dominated by agriculture with few remnants of natural hydrological/wetland systems. The most common stressors (presence of dike/levee, transportation corridor, adjacent orchard/nursery) are present throughout the Fresno to Bakersfield Section and affect all types of aquatic features to the extent that statistical relationships among stressors and AA condition scores are not observable.

6.4 Existing Condition Extrapolation

CRAM data reflect instantaneous condition snapshots of the assessed aquatic features, although the condition data identified in CRAM assessments represent an integration of the landscape, hydrological, physical, and biological factors affecting these features over time. To the extent that the underlying physical, hydrological, biotic, and land use conditions for the assessed features are represented elsewhere in the watersheds that contain the project elements, the CRAM scores may be used to infer condition (and functions provided) in other parts of those watersheds. However, making such extrapolations is not included within the CRAM methodology per se, and care is warranted in verifying the reach of the factors underlying CRAM scores if the object is to extrapolate condition scores from a sampled area to a larger area.

For example, in the case of the HST project in the Fresno to Bakersfield Section, the observed modifications to regional hydrology cover an enormous area outside of the immediate project vicinity, extending throughout the Tulare Lake basin from near Fresno to the area south of Bakersfield, and from the lower Sierra Nevada foothills to the Tulare Lake bed. Hydrological processes are the most significant of the factors determining condition scores, and it is reasonable to extrapolate condition scores within areas sharing similar hydrology. It is not unreasonable to consider that the CRAM condition data resulting from this work may apply in this region of altered hydrology.

Similarly, the regional land use pattern throughout the Tulare Lake basin very much resembles the agriculture-dominated pattern within which the CRAM data reported herein were collected. Land use patterns (through the Landscape and Buffer Attribute) are significant factors in determining condition scores, and are the primary sources of stressors that alter conditions in wetlands, and it is reasonable to extrapolate condition scores within areas exhibiting a similar, continuous land use pattern. It is not unreasonable to consider that the CRAM data from this work may be similarly applicable in agriculture-dominated landscape areas elsewhere.

Notwithstanding considerations of variations in regional conditions, the CRAM data reported in this report do reflect relative rankings among the aquatic features within each wetland type, both inside the region and across regions. As a general rule of practice, the CRAM methodology is applicable to all aquatic features within each wetland type (e.g., riverine wetlands, vernal pools, or depressional wetlands) throughout the state, and the relative rankings of sampled sites everywhere can be compared to one another. CRAM includes an "internal scale" comparing the condition of an aquatic feature at any site to the same "ideal" wetland for the type. This internal standard is intended to account for the regional and site-specific variability across each wetland type throughout the state, and CRAM scores are intended to provide relative rankings among the metrics, attributes, and index scores in proportion to the degree to which each site provides the conditions in the "ideal" model for that type. Hence riverine sites (for example) in the Fresno to Bakersfield Section that demonstrate lower condition scores than riverine features in northwestern California are considered to provide fewer riverine benefits in the same ratios as the index, attribute, and metric scores.

Because of the internal CRAM standard, the condition data for a feature of a given type (e.g., a vernal pool) near one project element can be compared directly to the condition data for another feature of the same type near a different element. This means that CRAM assessment results are directly applicable for comparing the conditions of similar elements across alternatives. The relative similarity of the important geological, ecological, and land use conditions throughout the Fresno to Bakersfield Section merely reinforce the conclusion that differences in CRAM scores among alternatives reflect actual differences among the sites. Consequently, these data are applicable in considering the relative effects of project alternative elements on these features; in other words, in identifying the Least Environmentally Damaging Practicable Alternative (LEDPA).

6.5 Using CRAM for Evaluating Existing Conditions at Potential Mitigation Sites

Compensatory mitigation for adverse impacts on aquatic resources will be determined in consultation with the USACE, in part through the assessment of aquatic resource conditions (including functions and values) that would be lost or impaired through construction and operation of the Fresno to Bakersfield Section of the HST System. Compensatory mitigation will preserve, create, and/or enhance aquatic resource conditions, functions, values, and services.

The USACE recently released guidance on the method used to determine mitigation ratios for different mitigation scenarios. This guidance is published in the *Standard Operating Procedure for Determination of Mitigation Ratios* (USACE 2012). Under the guidance, impact areas and mitigation sites are compared using CRAM evaluations/or other qualitative methods. Numerical or categorical values are assigned to the results of these evaluations and are used to calculate the required mitigation ratio. CRAM data will be key in determining the appropriate amounts of compensatory mitigation required to replace or compensate for the loss of wetlands (e.g., an impact on a wetland feature with a high CRAM index score would require a higher mitigation ratio to compensate for unavoidable impacts on the wetland feature).

The AAs evaluated at the mitigation sites are representative of the aquatic features present on the potential mitigation properties, in terms of both wetland type and condition. CRAM can be used to infer relative differences in wetland condition among sites and in this capacity can aid decisions about how to apply mitigation requirements to the potential mitigation sites. For example, the CRAM data collected and presented in this report can be used to determine which assessment areas could benefit from restoration or enhancement and which are suitable for preservation.

In general, potential mitigation sites with AAs receiving CRAM index scores >70 are suitable for preservation, sites with AAs scoring between 25 and 70 are suitable for enhancement and or re-establishment, and sites with no aquatic resources may be suitable for creation. Based on the wetland delineation and CRAM assessments conducted on these properties, the Buena Vista Dairy, Yang, Staffel, and Davis properties, when examined together, have a significant area of vernal pools that is suitable for preservation. These features are ideal candidates for preservation because they are in good condition and face manageable stressors. In addition to vernal pools, the Buena Vista Dairy property also features depressional wetlands in good condition that are therefore suitable for preservation. The Staffel, Davis, and Valadez properties feature depressional wetlands that have potential for enhancement because they have lower CRAM scores. Likewise, the riverine features on the Te Velde and Clark River Ranch properties have potential for enhancement based upon lower index scores.

Section 7.0
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7.0 References

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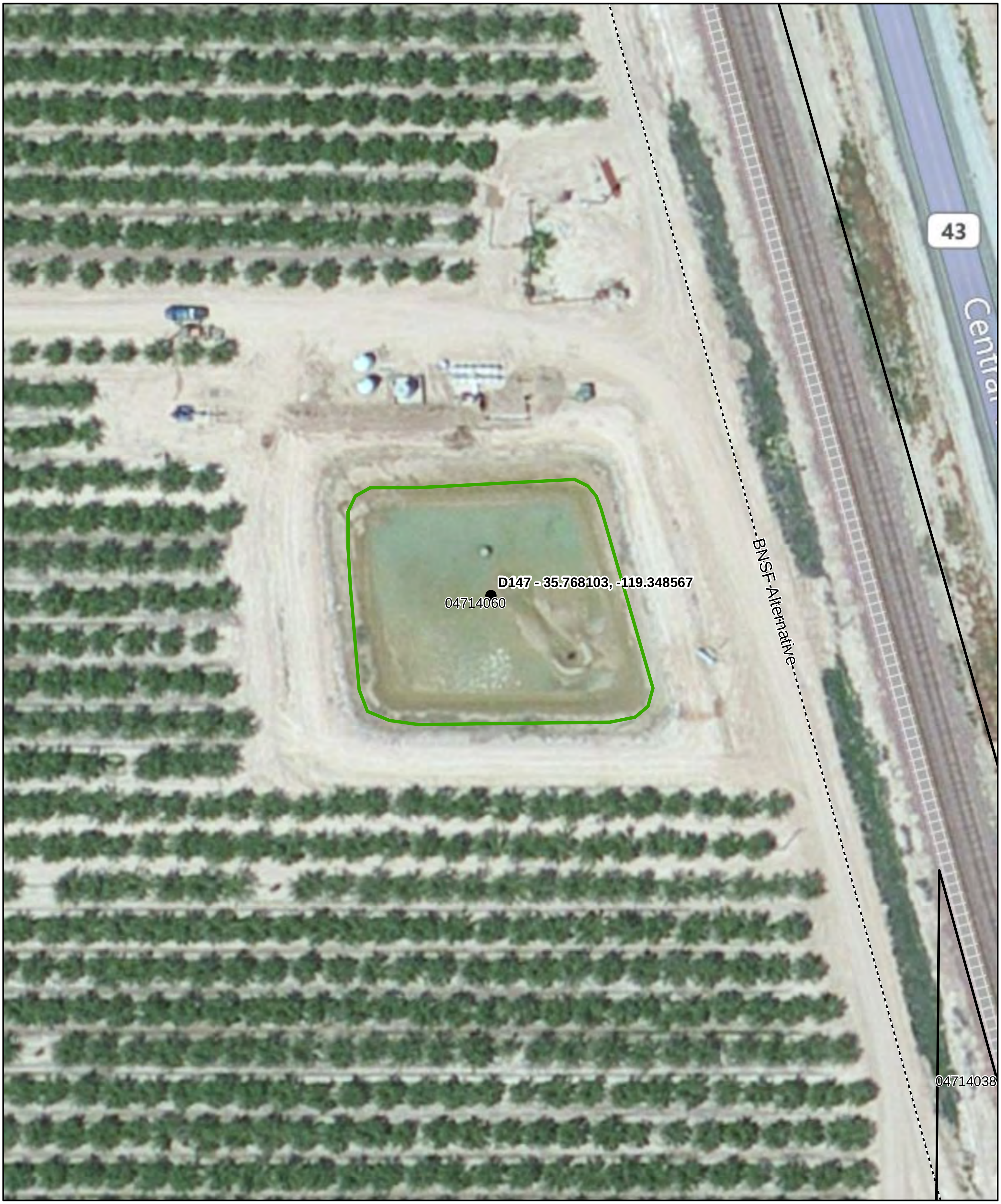
Appendix A
Maps of Assessment Areas



Assessment area: D147

0 10 20 40 Meters

1 inch equals 20 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: D203

0 15 30 45 60 75 Meters

1 inch equals 30 meters

N

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

Assessment area: D204

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

Assessment area: D205

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

Assessment area: D206

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

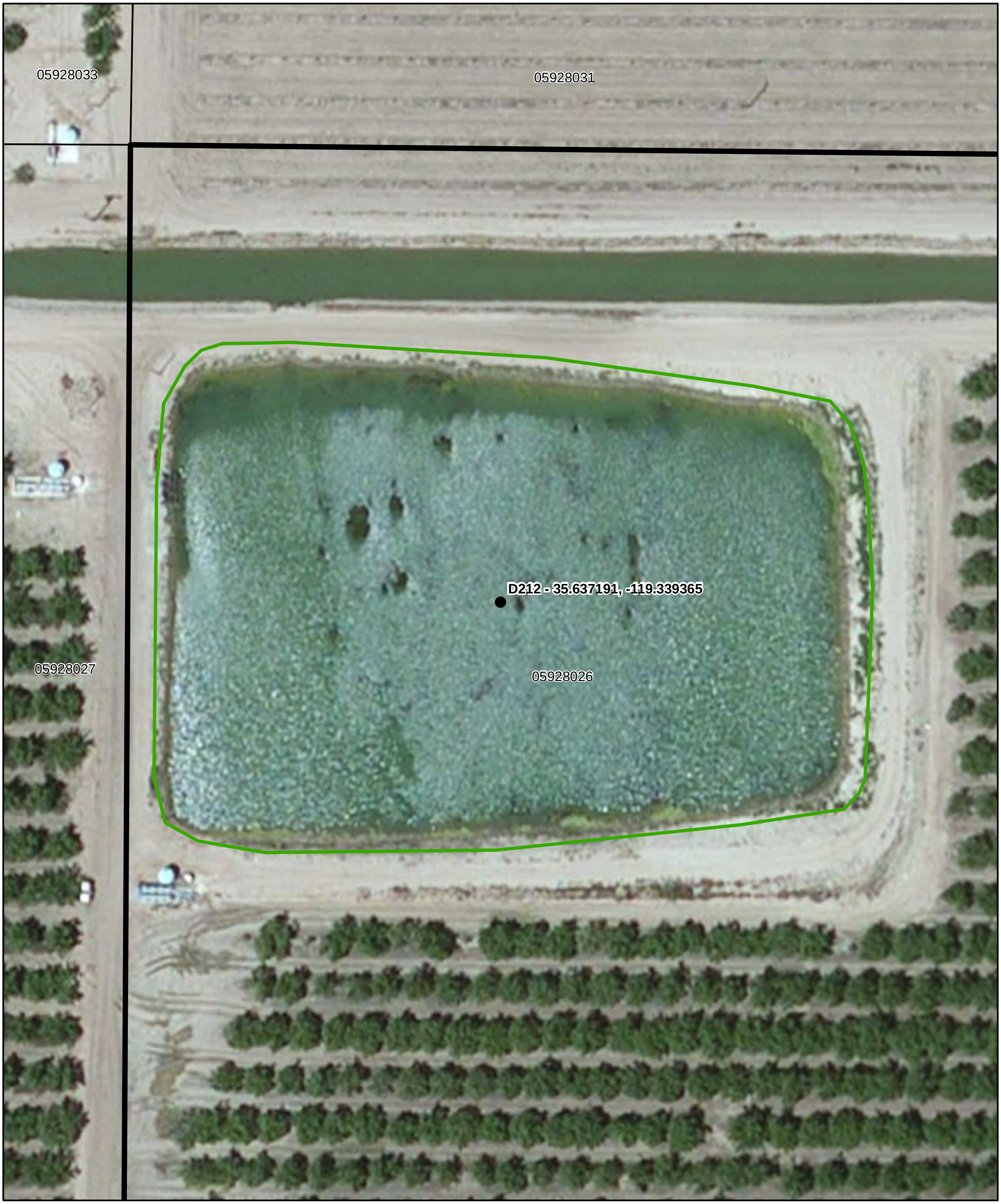
Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes



Assessment area: D212

0 10 20 30 40 50 Meters

1 inch equals 20 meters

N

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel PTE = Yes

Assessment area: D213

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel PTE = Yes

Assessment area: D214

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel PTE = Yes

Assessment area: R8

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: R63A

0 10 20 40 Meters

1 inch equals 20 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: R66

0 7.5 15 30 Meters

1 inch equals 15 meters

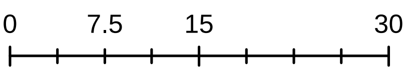
N

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)

- Assessment area centroid
- Alignment alternative
- Parcels

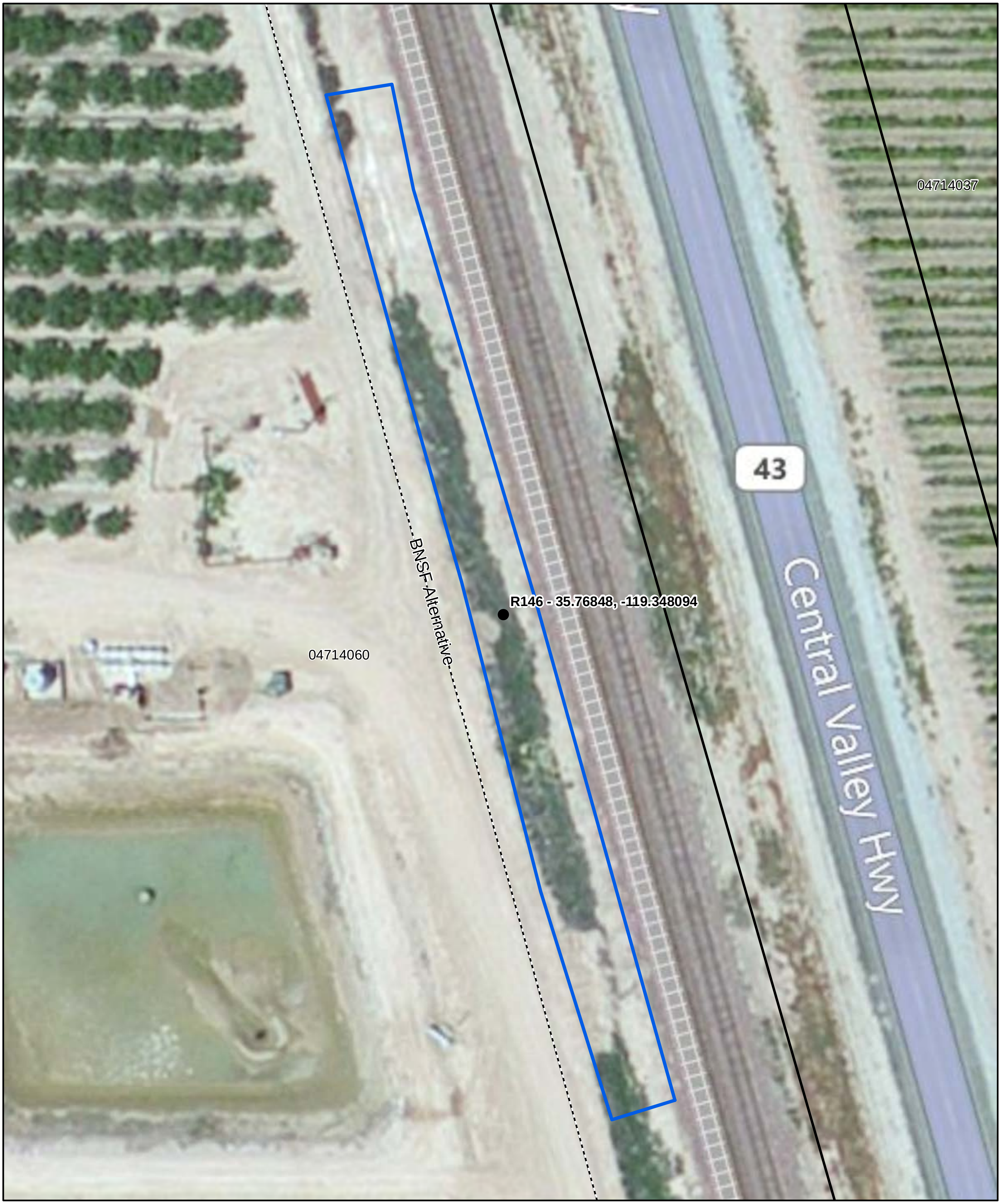
Assessment area: R71A



1 inch equals 15 meters

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)
- Assessment area centroid
- Alignment alternative
- Parcels



Assessment area: R146

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: R149

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: R150

0 9 18 36 Meters

1 inch equals 18 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

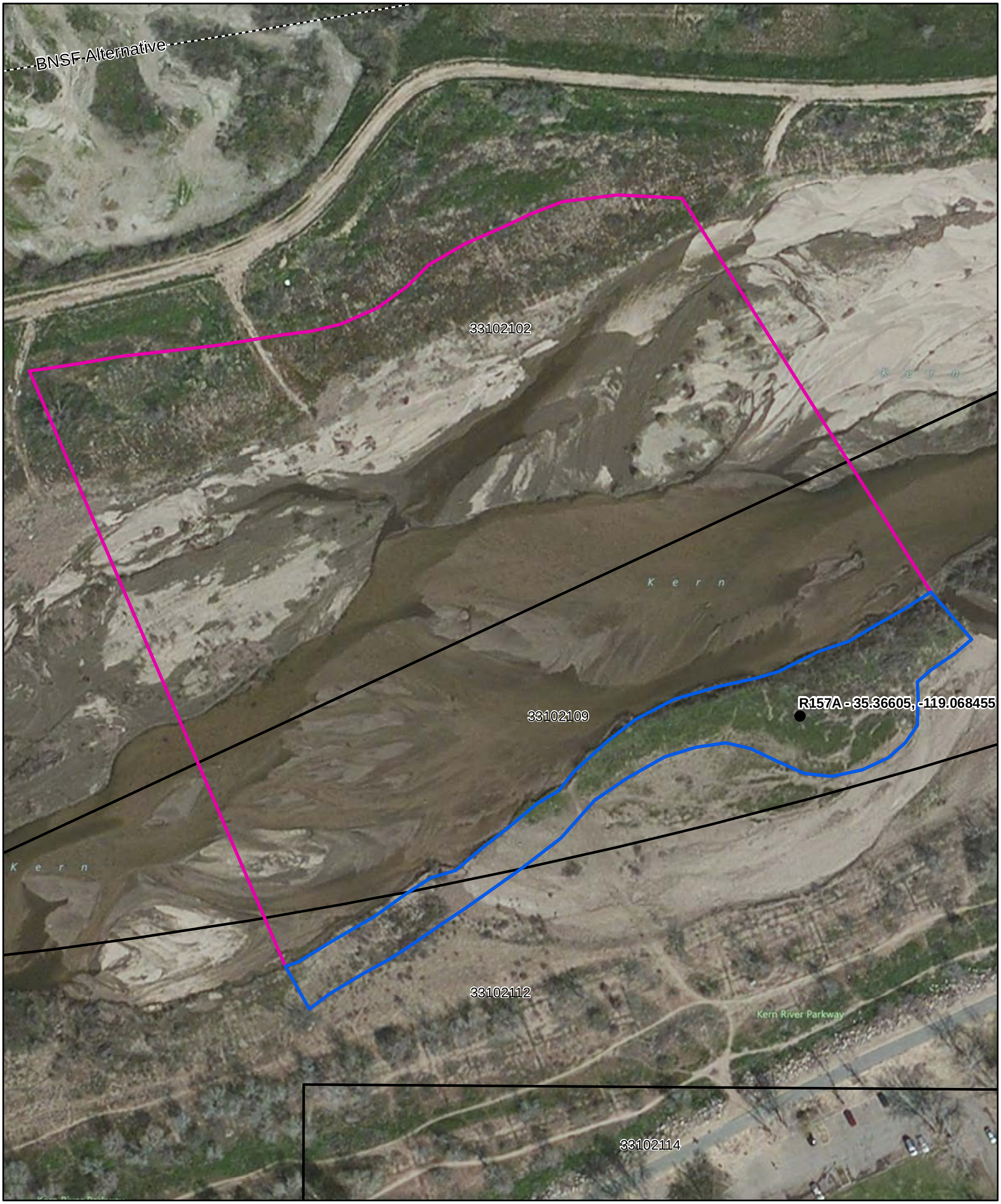
Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels



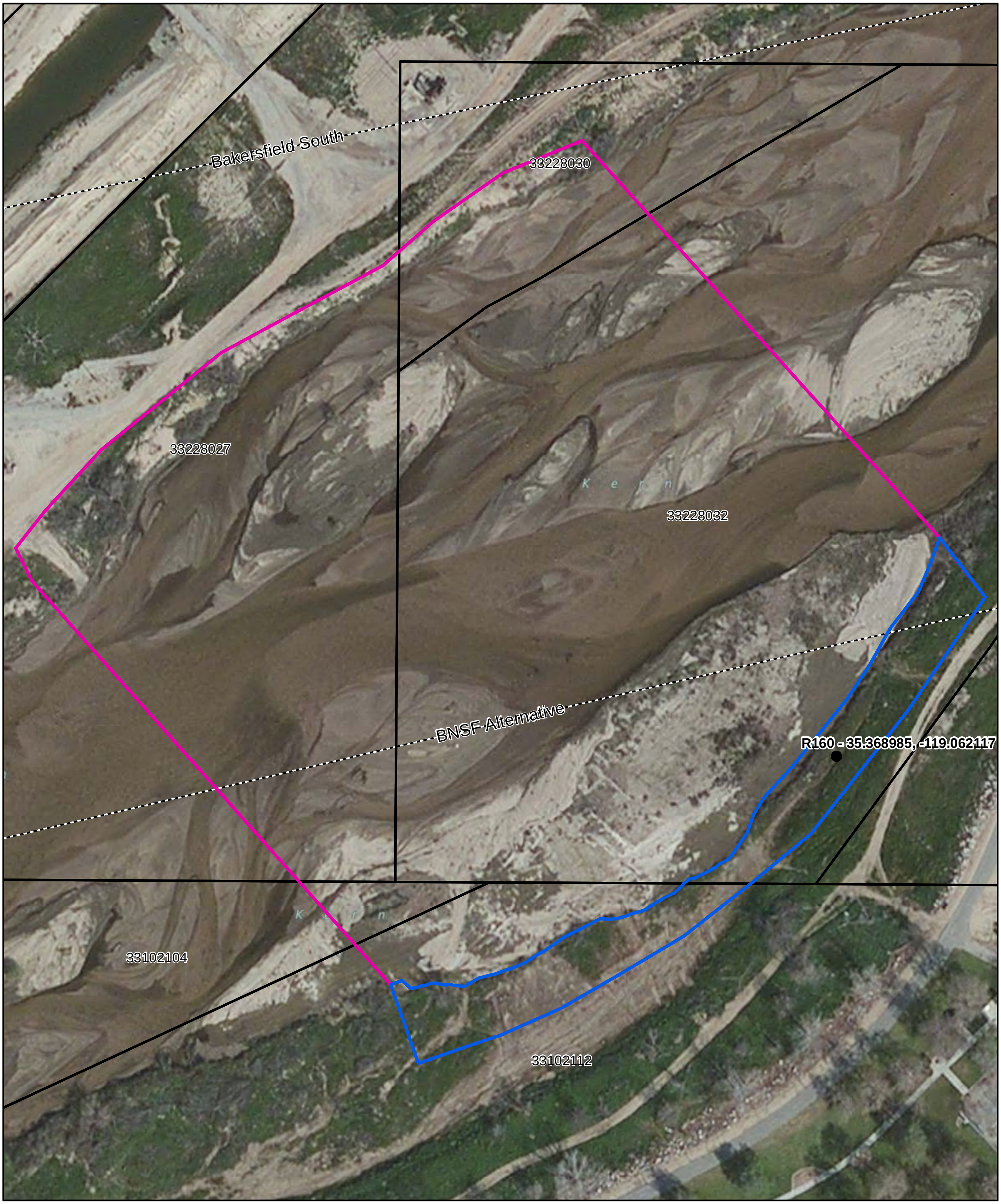
Assessment area: R157A

0 18 36 72 Meters

1 inch equals 36 meters

CRAM Assessment Area
- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)

- Assessment area centroid
- Alignment alternative
- CRAM Associated Area
- Parcels



Assessment area: R160

0 15 30 60 Meters

1 inch equals 30 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

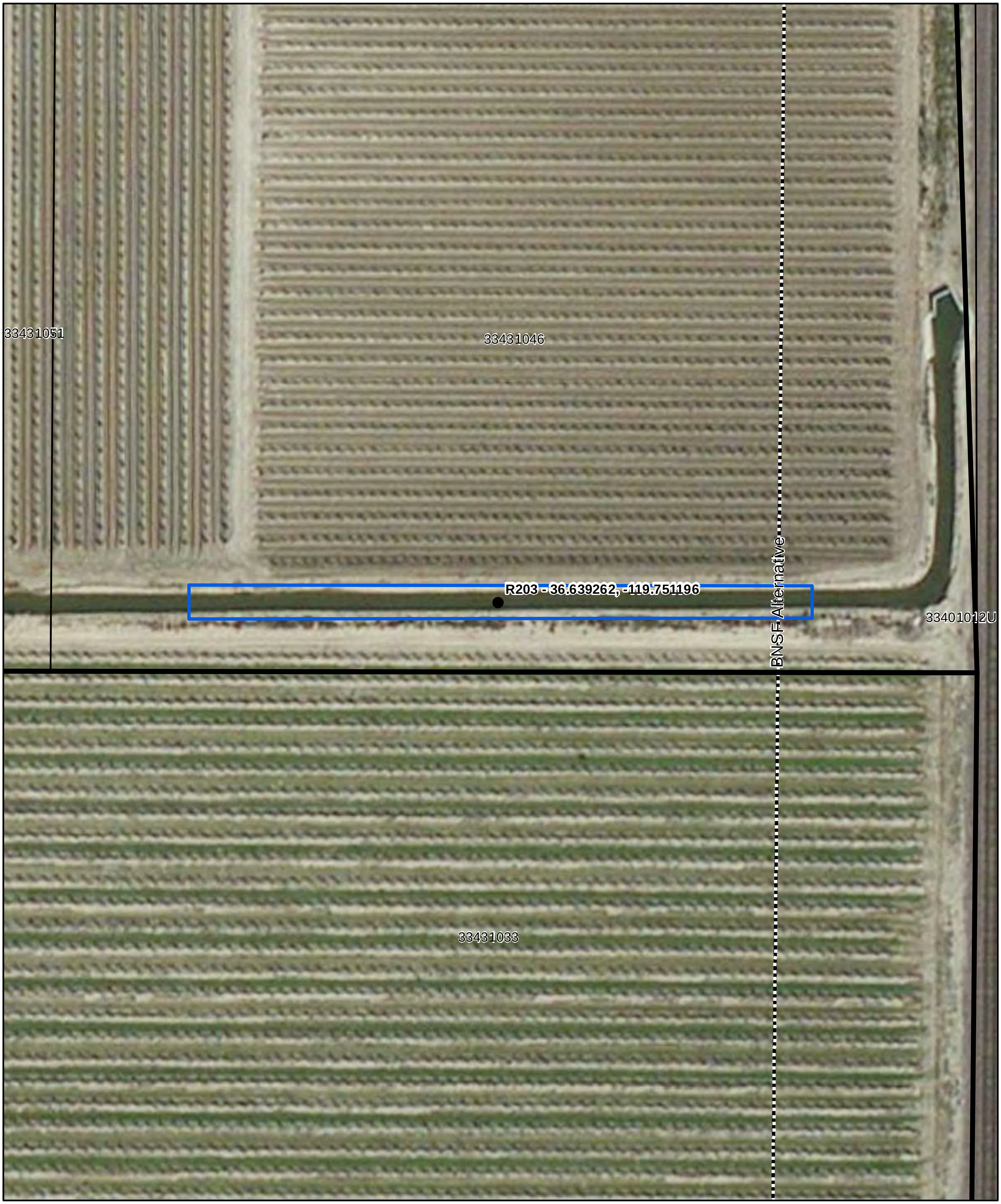
Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

CRAM Associated Area

Parcels



Assessment area: R203

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

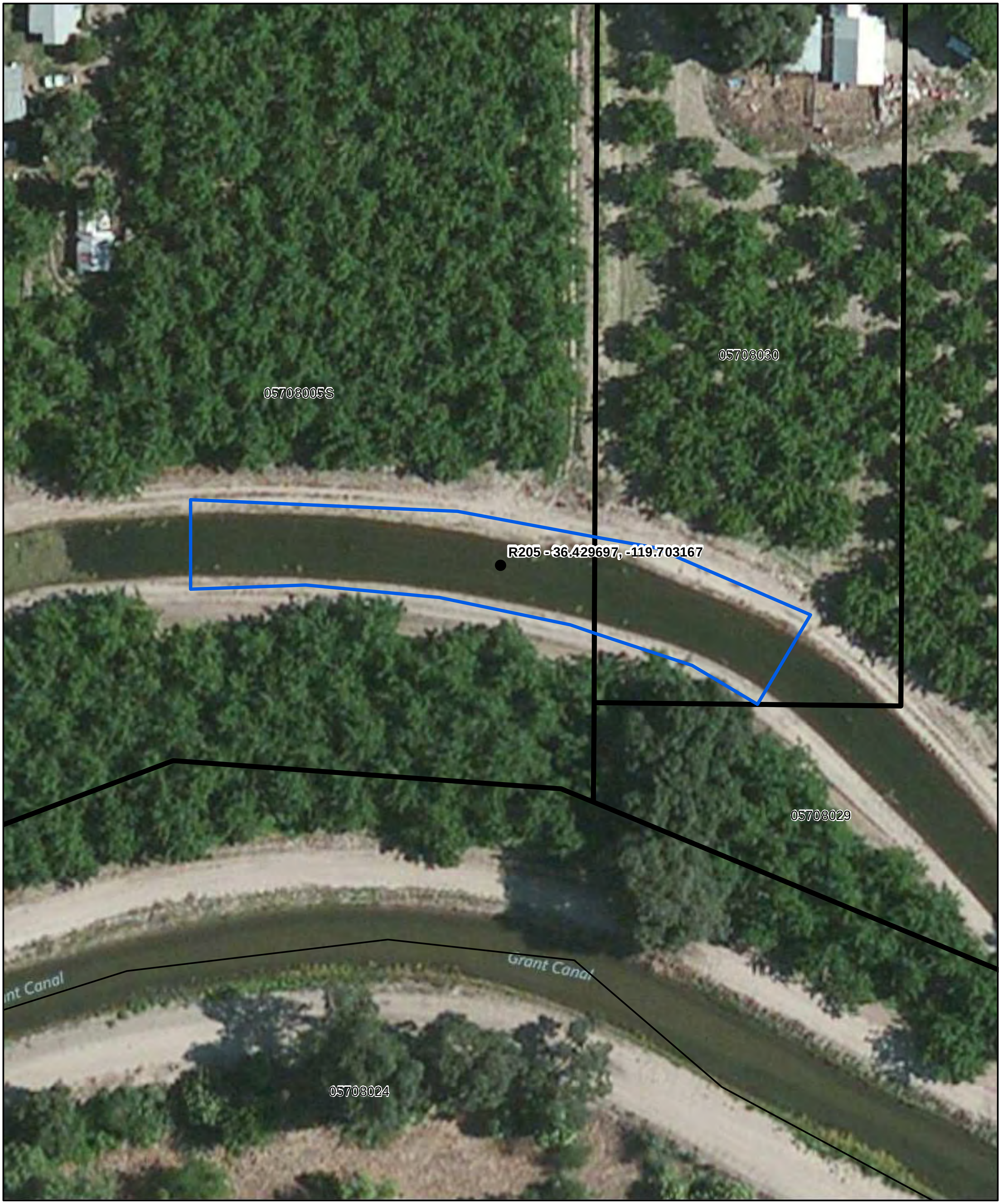
Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes



Assessment area: R205

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

Assessment area: R208

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel PTE = Yes

Assessment area: R209

0 10 20 30 40 50 Meters

N

1 inch equals 25 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

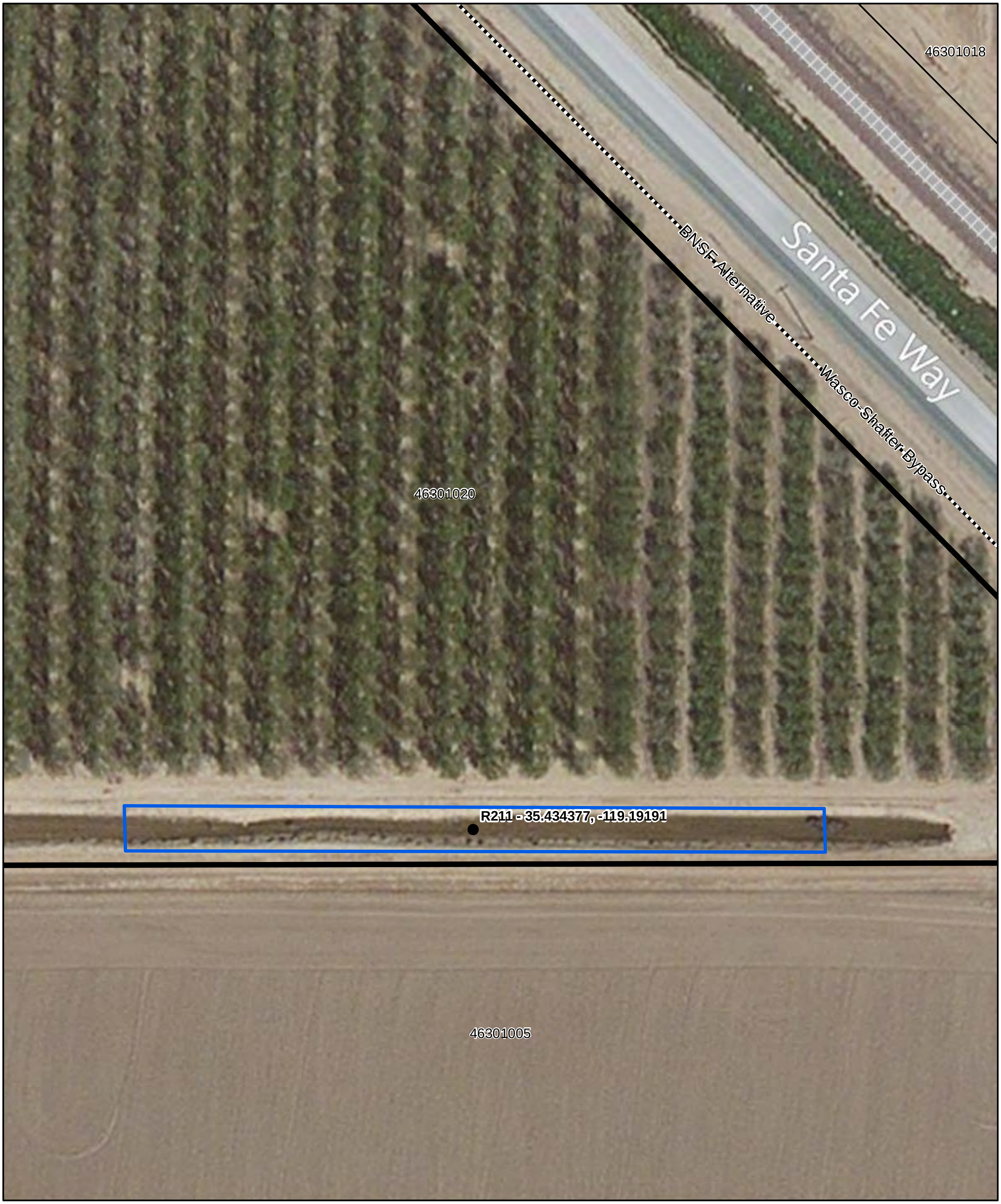
Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes



Assessment area: R211

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

Assessment area: R212

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

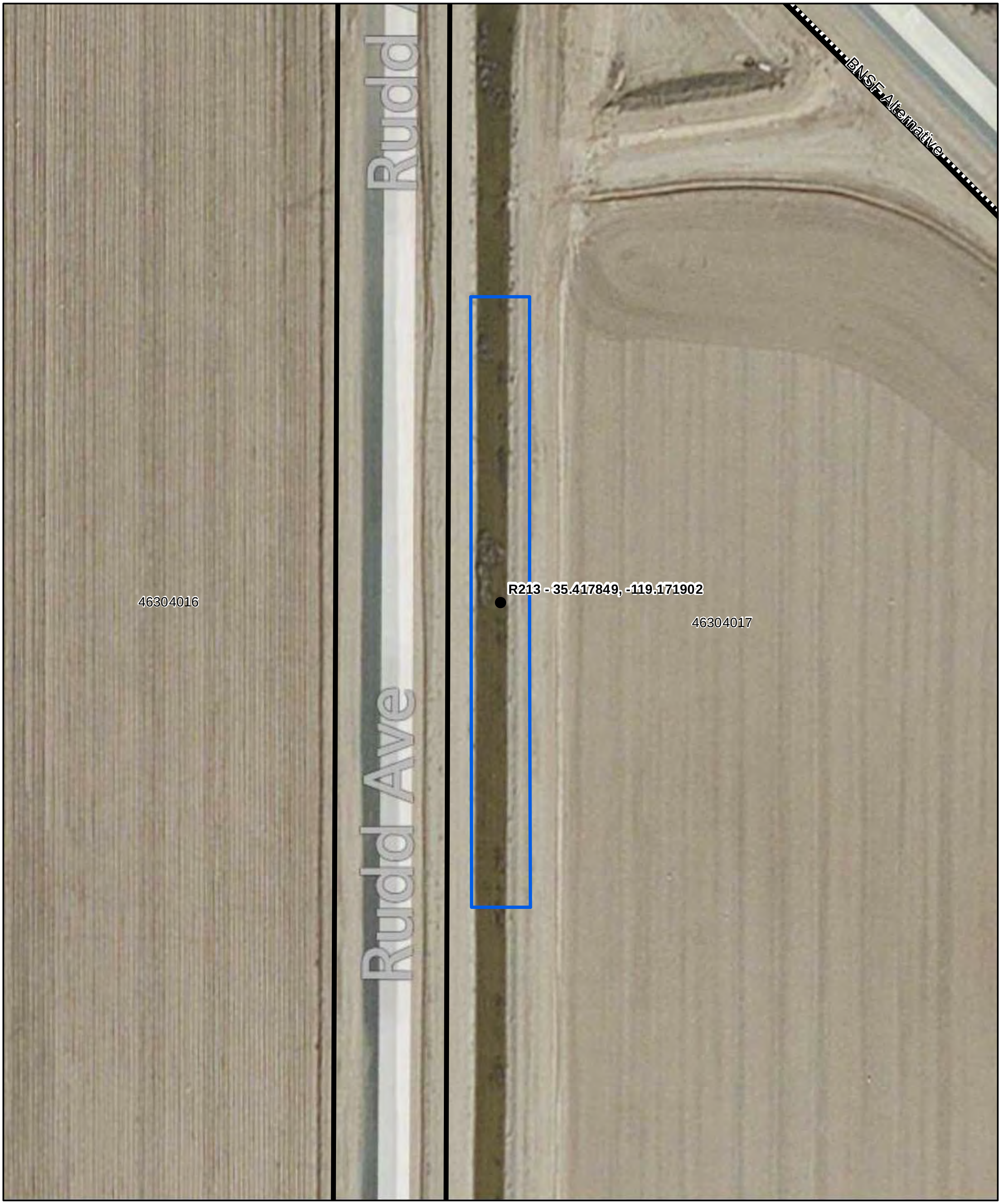
Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes



Assessment area: R213

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

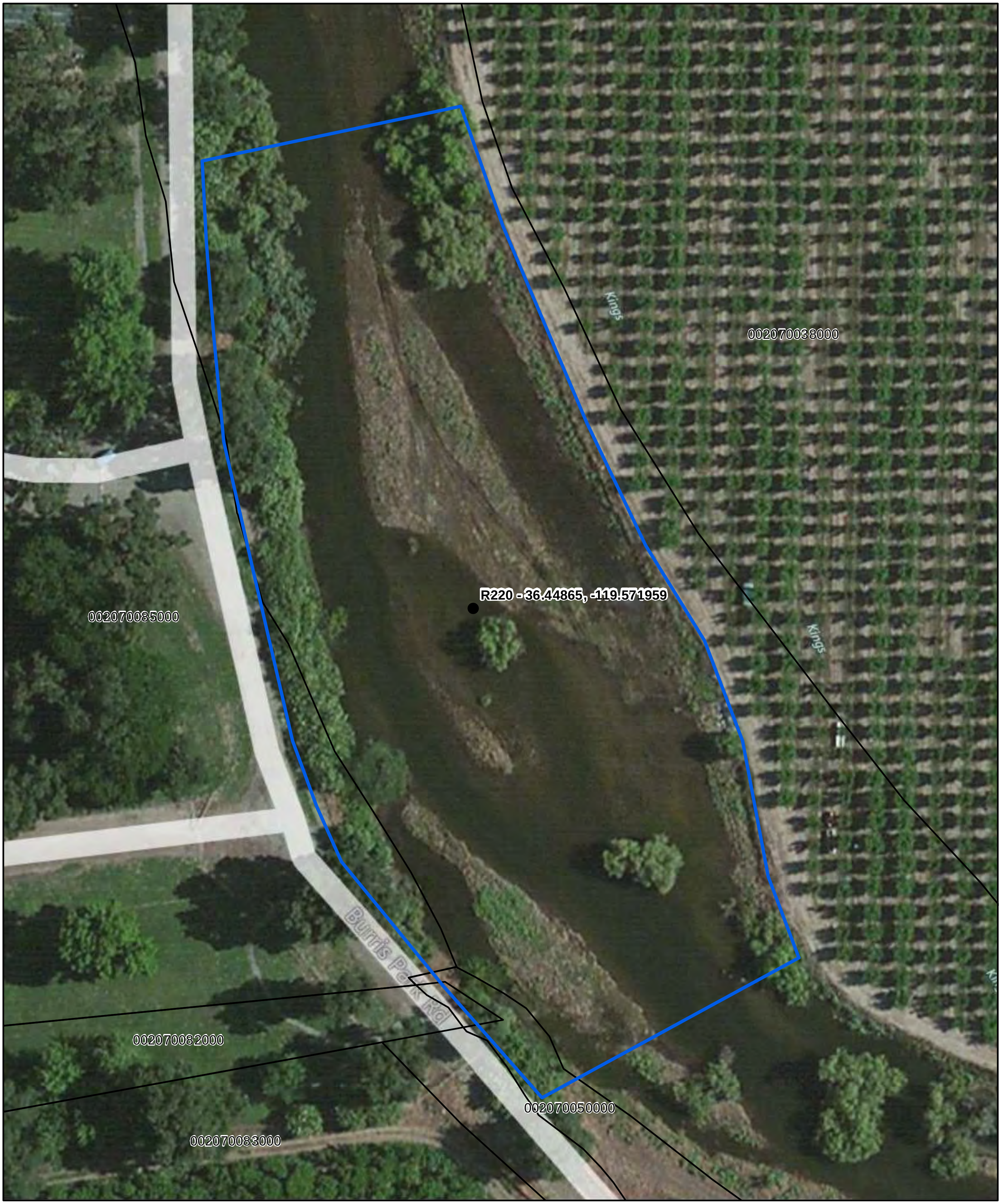
Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes



Assessment area: R220

0 10 20 30 40 50 Meters

1 inch equals 25 meters

N

CRAM Assessment Area

Depressional (D)

Lacustrine (L)

Riverine (R)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

Assessment area: V62A

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

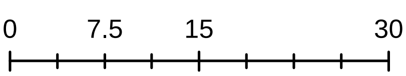
Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: V65



1 inch equals 15 meters

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)

- Assessment area centroid
- Alignment alternative
- Parcels

Assessment area: V70

0 5 10 20 Meters

1 inch equals 10 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: V72

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: V74

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: V75

0 10 20 40 Meters

1 inch equals 20 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: V76A

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: V76D

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

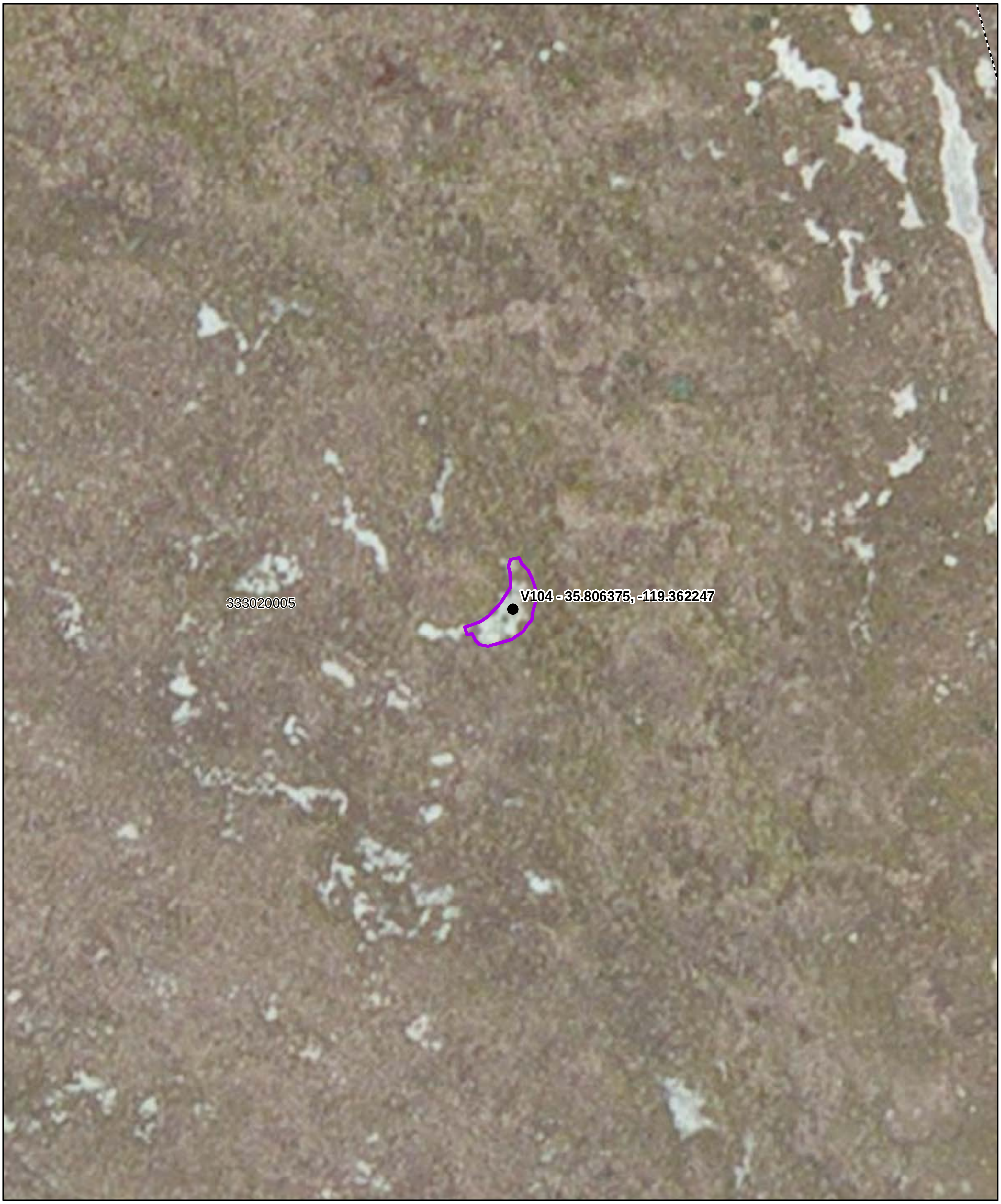
Vernal Pool (V)

Vernal Pool System (VS)

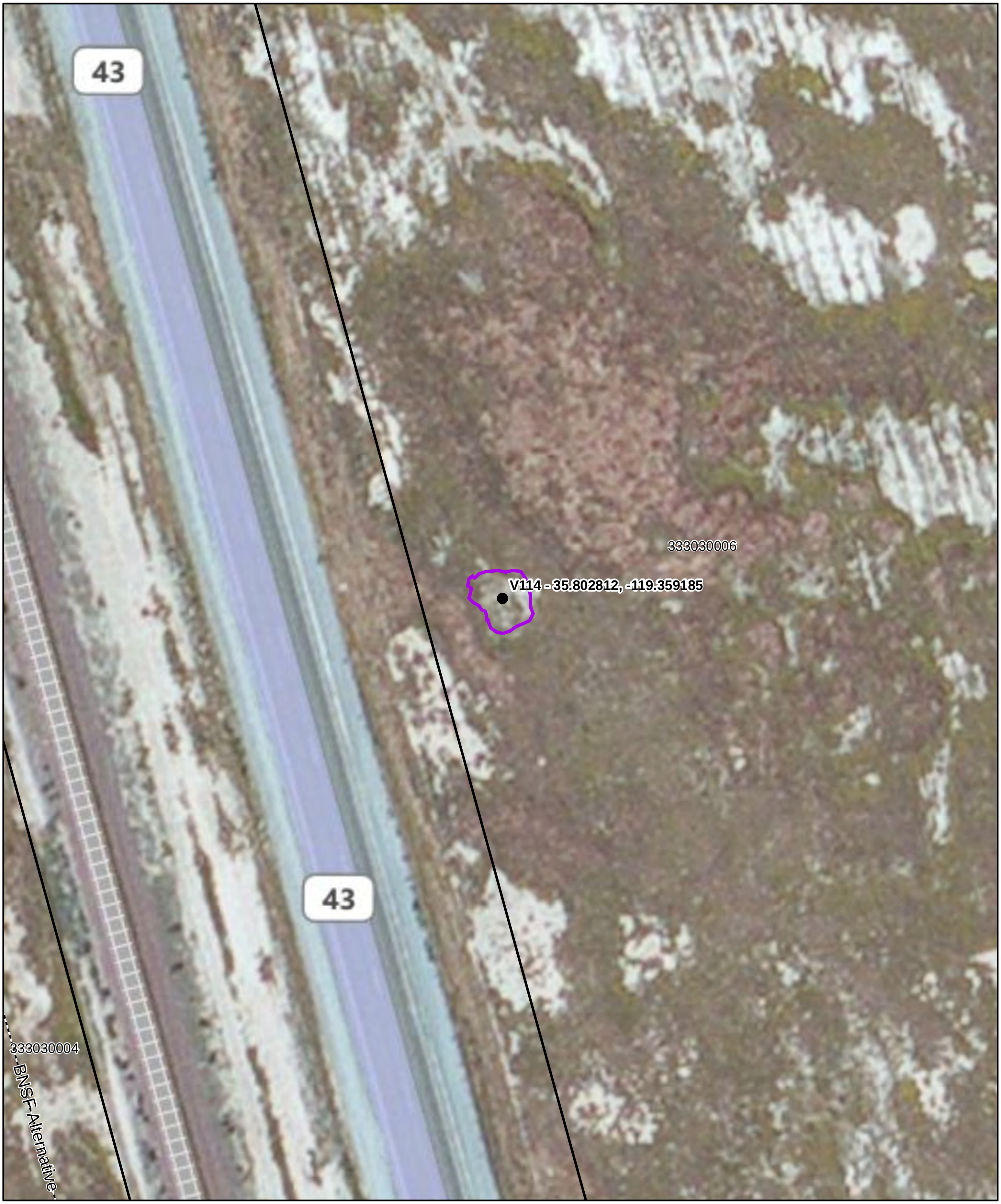
Assessment area centroid

Alignment alternative

Parcels



Assessment area: V104



Assessment area: V114

0 7.5 15 30 Meters

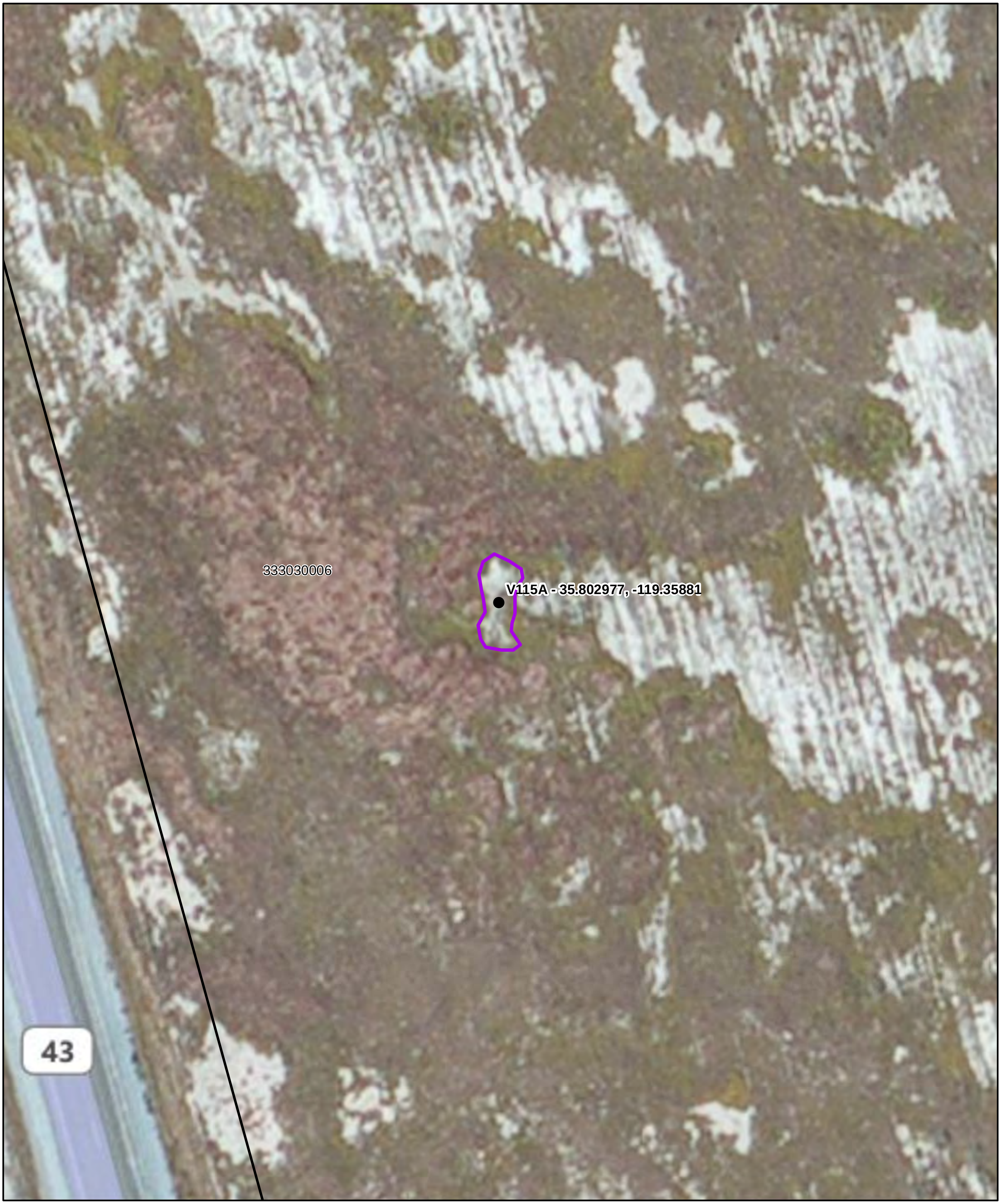
1 inch equals 15 meters

N

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)

- Assessment area centroid
- Alignment alternative
- Parcels



Assessment area: V115A

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: VS97A

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area
Depressional (D)
Riverine (R)
Vernal Pool (V)
Vernal Pool System (VS)

Assessment area centroid
Alignment alternative
Parcels

Assessment area: VS99A

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: VS104A

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

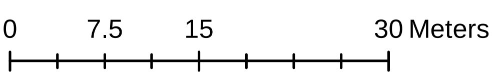
Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: VS107A



1 inch equals 15 meters

N

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)
- Assessment area centroid
- Alignment alternative
- Parcels

Assessment area: VS112

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: VS114A

0 7.5 15 30 Meters

1 inch equals 15 meters

N

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternative

Parcels

Assessment area: D304

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

Assessment area: D305

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

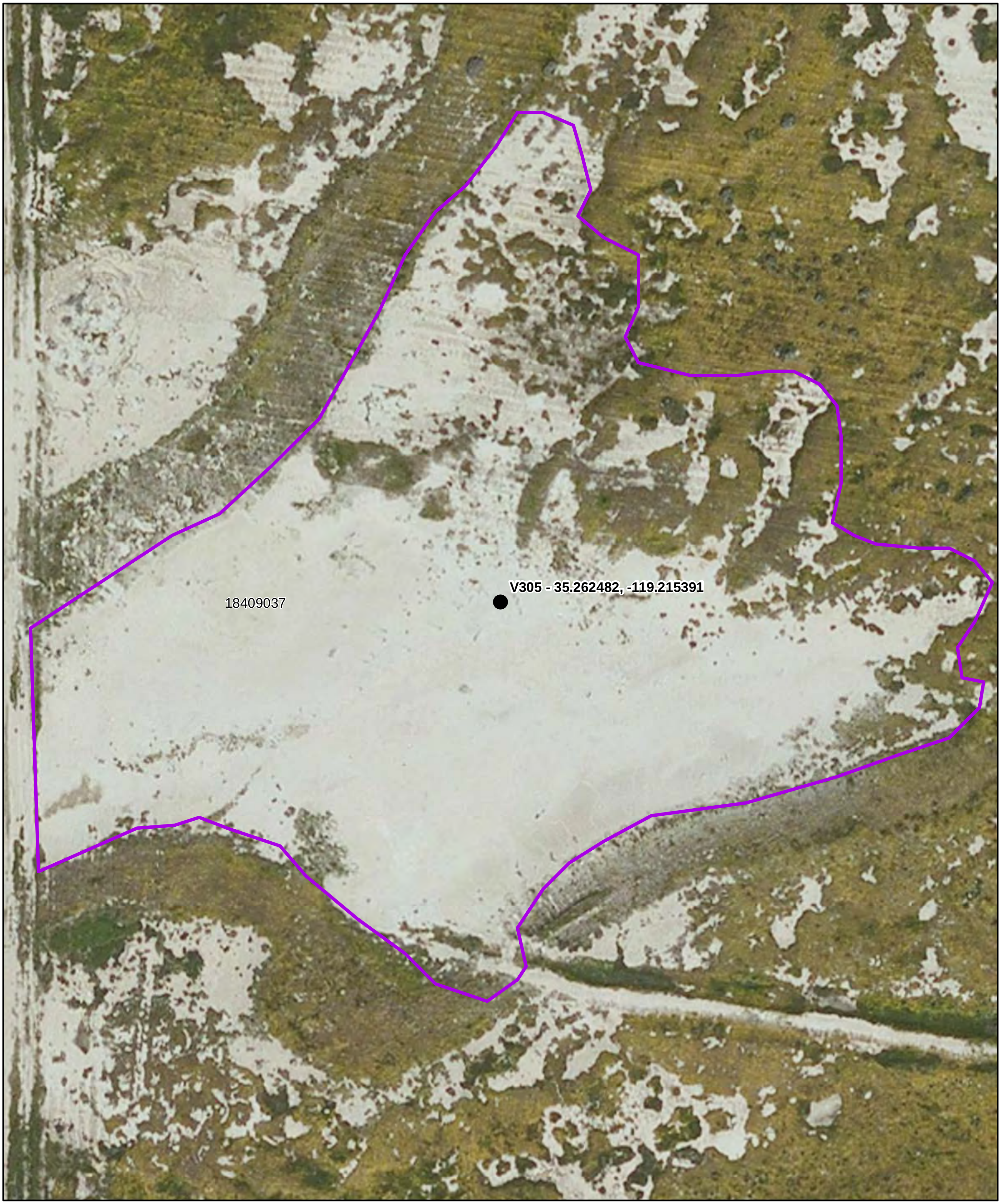
Vernal Pool System (VS)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes



Assessment area: V305

0 15 30 45 60 75 Meters

N

1 inch equals 30 meters

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

Assessment area: VS305

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

CRAM Centroid

Alignment alternatives

250 meter Buffer

Parcel

Parcel PTE = Yes

Assessment area: VS307

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

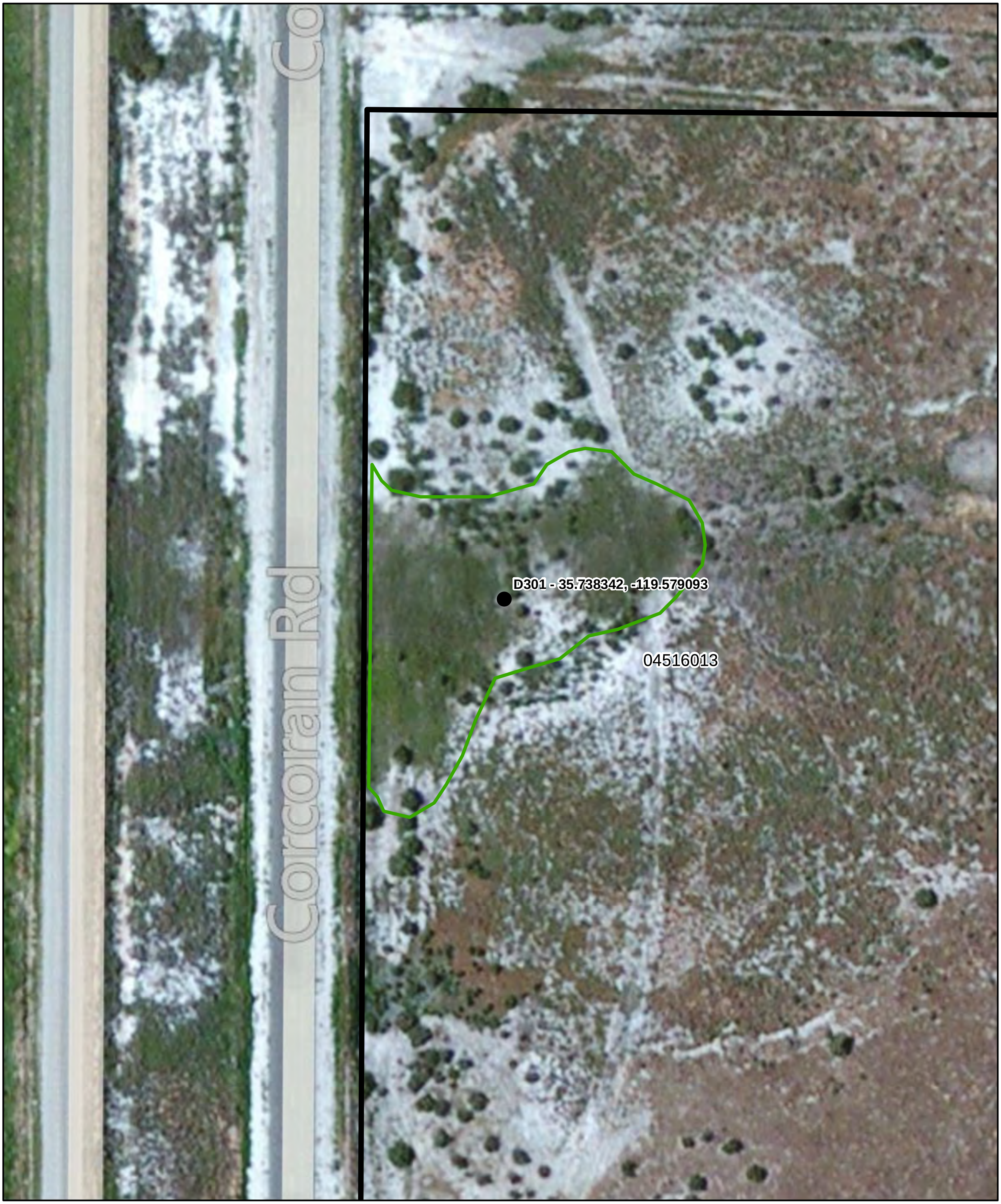
Vernal Pool System (VS)

Assessment area centroid

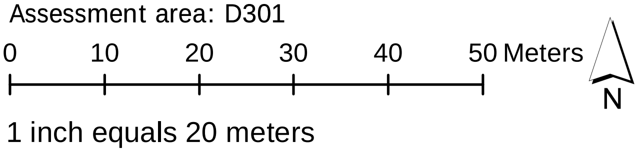
Alignment alternatives

Parcel

Parcel PTE = Yes



Assessment area: D301



CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternatives

250 meter Buffer

Parcel

Parcel PTE = Yes

Assessment area: D301A

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)
- Assessment area centroid
- Alignment alternatives
- Parcel
- Parcel PTE = Yes

Assessment area: V301

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

Assessment area: V302

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

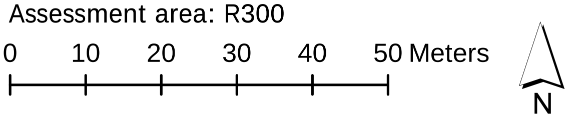
Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

Assessment area: R300



1 inch equals 25 meters

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)
- Assessment area centroid
- Alignment alternatives
- Parcel
- Parcel PTE = Yes

Assessment area: R302

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

Assessment area: D303

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

Assessment area: V303

0 10 20 30 40 50 Meters

N

1 inch equals 20 meters

CRAM Assessment Area

Depressional (D)

Riverine (R)

Vernal Pool (V)

Vernal Pool System (VS)

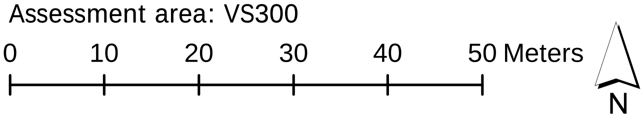
Assessment area centroid

Alignment alternatives

Parcel

Parcel PTE = Yes

Assessment area: VS300



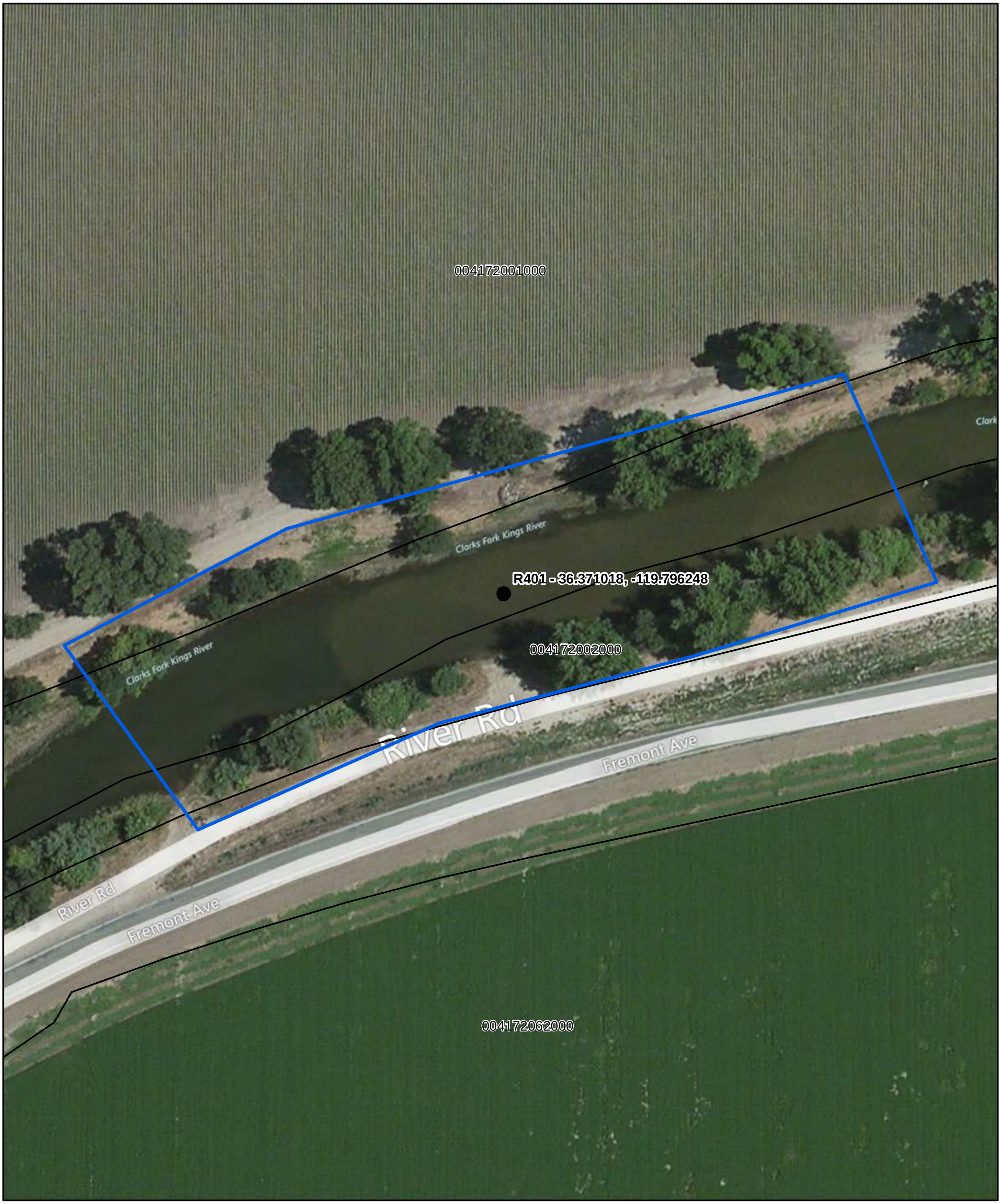
1 inch equals 20 meters

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)
- Assessment area centroid
- Alignment alternatives
- Parcel
- Parcel PTE = Yes


333050004
VS301 - 35.8004, -119.390299
333050005
Assessment area: VS301
0
10
20
30
40
50 Meters
N
1 inch equals 20 meters
CRAM Assessment Area
Depressional (D)
Riverine (R)
Vernal Pool (V)
Vernal Pool System (VS)
Assessment area centroid
Alignment alternatives
Parcel
Parcel PTE = Yes

333050006
VS303 - 35.797321, -119.385387
333050007
Assessment area: VS303
0
10
20
30
40
50 Meters
N
1 inch equals 20 meters
CRAM Assessment Area
Depressional (D)
Riverine (R)
Vernal Pool (V)
Vernal Pool System (VS)
Assessment area centroid
Alignment alternatives
Parcel
Parcel PTE = Yes



Assessment area: R401

0 20 40 60 80 100 Meters

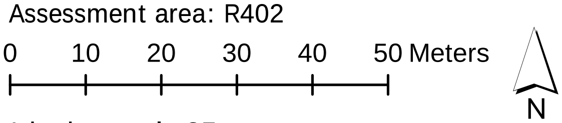
N

1 inch equals 35 meters

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)
- Assessment area centroid
- Parcel
- Parcel PTE = Yes

Assessment area: R402



1 inch equals 25 meters

CRAM Assessment Area

- Depressional (D)
- Riverine (R)
- Vernal Pool (V)
- Vernal Pool System (VS)
- Assessment area centroid
- Parcel
- Parcel PTE = Yes

Appendix B
Summary Table of CRAM Data

Table B-1
Summary Table of CRAM Data

AA Code	CRAM Type	Wetland Type	Watershed	Index Score[a]	Attribute Scores				Number of Stressors	Attribute Stressors			
					Buffer and Landscape Context	Hydrology	Physical Structure	Biotic Structure		Buffer and Landscape Stressors	Hydrology Stressors	Physical Stressors	Biotic Stressors
D147	Depressional	Agricultural reservoir	Upper Deer-Upper White	31.5	30	33	38	25	9	2	4	2	1
D203	Depressional	Seasonal basin	Tulare-Buena Vista Lakes	55.1	45	67	50	58	5	2	1	1	1
D204	Depressional	Seasonal basin	Tulare-Buena Vista Lakes	66.2	45	67	75	78	3	1	0	1	1
D205	Depressional	Detention basin	Tulare-Buena Vista Lakes	41.2	29	58	25	53	2	1	1	0	0
D206	Depressional	Detention basin	Tulare-Buena Vista Lakes	43.4	38	58	25	53	1	1	0	0	0
D212	Depressional	Agricultural reservoir	Upper Poso	51.6	30	50	63	64	1	0	0	0	1
D213	Depressional	Agricultural reservoir	Upper Poso	44.4	33	50	25	69	1	0	0	0	1
D214	Depressional	Agricultural reservoir	Tulare-Buena Vista Lakes	34.6	30	50	25	33	4	3	0	0	1
R8	Riverine	Seasonal riverine	Tulare-Buena Vista Lakes	67.3	75	75	63	56	11	4	4	2	1
R63A	Riverine	Ditch	Upper Deer-Upper White	68.3	93	75	38	67	7	2	1	2	2
R66	Riverine	Ditch	Upper Deer-Upper White	67.0	90	67	50	61	7	2	2	2	1
R71A	Riverine	Ditch	Upper Deer-Upper White	61.3	93	83	38	31	6	1	3	2	0
R146	Riverine	Ditch	Upper Deer-Upper White	43.0	29	58	38	47	9	2	1	4	2
R149	Riverine	Seasonal riverine	Upper Poso	63.0	63	67	50	72	6	2	2	1	1
R150	Riverine	Seasonal riverine	Upper Poso	61.3	75	67	50	53	10	2	3	3	2
R157A	Riverine	Seasonal riverine	Middle Kern-Upper Tehachapi-Grapevine	65.3	59	67	63	72	8	6	0	1	1
R160	Riverine	Seasonal riverine	Middle Kern-Upper Tehachapi-Grapevine	60.5	75	50	50	67	10	6	1	3	0
R203	Riverine	Canal	Upper Dry	27.8	25	25	25	36	3	2	0	1	0
R205	Riverine	Canal	Upper Dry	37.9	63	33	25	31	5	1	2	2	0
R208	Riverine	Seasonal riverine	Upper Kaweah	67.2	68	67	63	72	2	2	0	0	0
R209	Riverine	Canal	Upper Kaweah	45.4	66	42	38	36	5	3	0	2	0
R211	Riverine	Ditch	Tulare-Buena Vista Lakes	45.7	43	42	63	36	9	3	3	2	1
R212	Riverine	Ditch	Tulare-Buena Vista Lakes	42.6	68	42	25	36	8	3	3	1	1
R213	Riverine	Ditch	Tulare-Buena Vista Lakes	42.3	66	42	25	36	7	3	2	1	1
R220	Riverine	Seasonal riverine	Tulare-Buena Vista Lakes	72.9	78	75	75	64	5	2	2	0	1
V62A	Individual Vernal Pool	Vernal swale and pool complex	Upper Deer-Upper White	72.6	78	92	50	71	7	2	1	2	2
V65	Individual Vernal Pool	Vernal swale and pool complex	Upper Deer-Upper White	76.4	93	92	50	71	4	2	1	1	0

Table B-1
Summary Table of CRAM Data

AA Code	CRAM Type	Wetland Type	Watershed	Index Score[a]	Attribute Scores: Buffer and Landscape Context	Attribute Scores: Hydrology	Attribute Scores: Physical Structure	Attribute Scores: Biotic Structure	Number of Stressors	Attribute Stressors: Buffer and Landscape Stressors	Attribute Stressors: Hydrology Stressors	Attribute Stressors: Physical Stressors	Attribute Stressors: Biotic Stressors
V70	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	56.7	56	75	38	58	5	1	2	2	0
V72	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	66.0	56	83	50	75	5	1	2	2	0
V74	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	72.3	56	83	75	75	6	1	2	2	1
V75	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	66.0	56	83	63	63	5	1	2	2	0
V76A	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	62.1	61	83	50	54	4	1	2	0	1
V76D	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	59.8	81	83	50	25	3	1	2	0	0
V104	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	77.5	93	100	50	67	3	2	1	0	0
V114	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	79.9	91	83	63	83	3	1	1	1	0
V115A	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	80.9	90	100	63	71	2	1	1	0	0
VS97A	Vernal Pool Systems	Vernal swale and pool complex	Upper Deer-Upper White	76.7	78	83	75	71	4	2	1	1	0
VS99A	Vernal Pool Systems	Vernal swale and pool complex	Upper Deer-Upper White	82.7	93	92	75	71	2	2	0	0	0
VS104A	Vernal Pool Systems	Vernal swale and pool complex	Upper Deer-Upper White	77.8	78	100	75	58	3	2	1	0	0
VS107A	Vernal Pool Systems	Vernal pool	Upper Deer-Upper White	80.6	81	100	75	67	2	2	0	0	0
VS112	Vernal Pool Systems	Vernal swale and pool complex	Upper Deer-Upper White	76.7	78	75	83	71	3	1	1	1	0
VS114A	Vernal Pool Systems	Vernal swale and pool complex	Upper Deer-Upper White	80.9	90	100	67	67	2	1	1	0	0
Potential Mitigation Sites													
Buena Vista Dairy													
D304	Depressional	Depressional wetland	Middle Kern-Upper Tehachapi-Grapevine	70.9	81	83	50	69	3	2	1	0	0
D305	Depressional	Depressional wetland	Middle Kern-Upper Tehachapi-Grapevine	70.5	93	83	50	56	3	2	1	0	0
V305	Individual Vernal Pool	Vernal pool	Middle Kern-Upper Tehachapi-Grapevine	75.4	93	92	63	54	2	1	1	0	0
VS305	Vernal Pool Systems	Vernal swale and pool complex	Middle Kern-Upper Tehachapi-Grapevine	80.6	93	92	75	63	2	1	1	0	0
VS307	Vernal Pool Systems	Vernal swale and pool complex	Middle Kern-Upper Tehachapi-Grapevine	81.7	93	92	75	67	2	1	1	0	0
Davis													
D301	Depressional	Seasonal wetland	Tulare-Buena Vista Lakes	70.7	84	83	38	78	3	2	1	0	0
D301A	Depressional	Seasonal wetland	Tulare-Buena Vista Lakes	68.6	84	83	38	69	3	2	1	0	0
Staffel													
V301	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	77.5	93	92	50	75	2	1	0	1	0

Table B-1
Summary Table of CRAM Data

AA Code	CRAM Type	Wetland Type	Watershed	Index Score[a]	Attribute Scores				Number of Stressors	Attribute Stressors			
					Buffer and Landscape Context	Hydrology	Physical Structure	Biotic Structure		Buffer and Landscape Stressors	Hydrology Stressors	Physical Stressors	Biotic Stressors
V302	Individual Vernal Pool	Vernal pool	Upper Deer-Upper White	70.2	93	92	38	58	2	1	0	1	0
Te Velde													
R300	Riverine	Seasonal riverine	Upper Tule	54.1	68	58	38	53	6	1	2	3	0
R302	Riverine	Seasonal riverine	Upper Tule	61.7	68	75	38	68	6	1	2	3	0
Valadez													
D303	Depressional	Seasonal basin	Tulare-Buena Vista Lakes	58.5	48	67	50	69	3	2	0	1	0
V303	Individual Vernal Pool	Vernal pool	Tulare-Buena Vista Lakes	57.7	56	100	38	38	1	1	0	0	0
Yang													
VS300	Vernal Pool Systems	Vernal swale and pool complex	Upper Deer-Upper White	77.5	93	92	68	58	1	1	0	0	0
VS301	Vernal Pool Systems	Vernal swale and pool complex	Upper Deer-Upper White	84.8	93	92	83	71	1	1	0	0	0
VS303	Vernal Pool Systems	Vernal swale and pool complex	Upper Deer-Upper White	80.6	93	92	75	63	0	0	0	0	0
Clark River Ranch													
R401	Riverine	Seasonal riverine	Tulare-Buena Vista Lakes	58.7	75	67	38	56	7	2	2	3	0
R402	Riverine	Seasonal riverine	Tulare-Buena Vista Lakes	60.8	63	58	50	72	9	3	3	3	0

[a] The averages of the Attribute scores may not exactly match the Index score due to rounding.

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Appendix C
Assessment Area of Data Forms

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: C. Roberts		
Assessment Area Name: D147		
Assessment No.		**Date (mm/dd/yyyy):** 09/21/2011

Assessment Team Members for This AA

C. Roberts

C. Julian

A. Langston

J. Love

AA Category:

□ Restoration □ Mitigation □ Impacted **X** Other

Which best describes the type of depressional wetland?

□ freshwater marsh □ alkaline marsh □ alkali flat **X** other (specify):

Retention /detention basin

Which best describes the hydrologic state of the wetland at the time of assessment?

X ponded/inundated □ saturated soil, but no surface water □ dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

X long-duration □ medium-duration □ short-duration

Does your wetland connect with the floodplain of a nearby stream? □ yes **X** no

Is the topographic basin of the wetland **X** distinct **or** □ indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1205	North			
2	1207	South			
3	1206	East			
4	1208	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: D147				**Date:** 09/21/2011	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		3			
Buffer submetric A: Percent of AA with Buffer	12			Unpaved area > 5 m wide	
Buffer submetric B: Average Buffer Width	3			Avg=16	
Buffer submetric C: Buffer Condition	3				
D + [C x (A x B)$^{1/2}$] $^{1/2}$ = **Attribute Score**		Raw	Final	Final Attribute Score = (Raw Score/24)100	30
		7	30		
Hydrology					
Water Source		6			
Hydroperiod or Channel Stability		3			
Hydrologic Connectivity		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	33
		12	33		
Physical Structure					
Structural Patch Richness		3		2 patch types	
Topographic Complexity		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	38
		9	38		
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	3			Non-vegetated	
Plant Community submetric B: Number of Co-dominant species	3				
Plant Community submetric C: Percent Invasion	3				
Plant Community Metric (*average of submetrics A-C*)		3			
Horizontal Interspersion and Zonation		3			
Vertical Biotic Structure		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	25
		9	25		
Overall AA Score (Average of Final Attribute Scores)				**31.5**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows	X	X
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)	X	X
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	X
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology	X	X
Comments		
Pumped retention/detention basin		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**	X	X
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)	X	X
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
Surrounded by levee/dirt road; orchard (impairing nutrients)		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control	X	
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		
Likely mosquito control; pesticide for trees?		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	X
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	X
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
Surrounded by orchard, next to HWY 43 and BNSF		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: A. Langston	
Assessment Area Name: D203	
Assessment No.	**Date (mm/dd/yyyy):** 03/08/2012

Assessment Team Members for This AA

G. Peracca

J. Whitfield

C. Roberts

A. Langston

AA Category:

[ ] Restoration [ ] Mitigation X Impacted [ ] Other

Which best describes the type of depressional wetland?

[ ] freshwater marsh [ ] alkaline marsh [ ] alkali flat X other (specify):

Impounded historic riverine channel.

Which best describes the hydrologic state of the wetland at the time of assessment?

[ ] ponded/inundated [ ] saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

[ ] long-duration X medium-duration [ ] short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes X no

Is the topographic basin of the wetland X distinct **or** [ ] indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1709	North			
2	1712	South			
3	1710	East			
4	1711	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: D203			**Date:** 03/08/2012	
Attributes and Metrics		**Scores**	**Comments**	
Buffer and Landscape Context				
Landscape Connectivity (D)		3	Avg=2.5%	
Buffer submetric A: Percent of AA with Buffer	12		100% with buffer	
Buffer submetric B: Average Buffer Width	9		Avg= 150.6 meters	
Buffer submetric C: Buffer Condition	6			
$D + [C \times (A \times B)^{1/2}]^{1/2}$ = **Attribute Score**	Raw: 10.9	Final: 45.4	Final Attribute Score = (Raw Score/24)100	45.4
Hydrology				
Water Source		9	groundwater	
Hydroperiod or Channel Stability		3		
Hydrologic Connectivity		12		
Attribute Score	Raw: 24	Final: 66.7	Final Attribute Score = (Raw Score/36)100	66.7
Physical Structure				
Structural Patch Richness		6	7 Patches	
Topographic Complexity		6		
Attribute Score	Raw: 12	Final: 50	Final Attribute Score = (Raw Score/24)100	50
Biotic Structure				
Plant Community submetric A: Number of Plant Layers	6		2 Layers	
Plant Community submetric B: Number of Co-dominant species	3		4 co-dominant spp.	
Plant Community submetric C: Percent Invasion	9		25% non-native spp.	
Plant Community Metric (*average of submetrics A-C*)		6		
Horizontal Interspersion and Zonation		12		
Vertical Biotic Structure		3		
Attribute Score	Raw: 21	Final: 58.3	Final Attribute Score = (Raw Score/36)100	58.3
Overall AA Score (Average of Final Attribute Scores)			**55.1**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology	X	
Comments		
Surrounding agricultural pumping within 50m draining into ending slope of AA.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse	X	
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation	X	
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture	X	
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: G. Peracca		
Assessment Area Name: D204		
Assessment No.		**Date (mm/dd/yyyy):** 03/08/2012

Assessment Team Members for This AA

J. Whitfield

C. Roberts

G. Peracca

A. Langston

AA Category:

[ ] Restoration [ ] Mitigation X Impacted X Other

Which best describes the type of depressional wetland?

[ ] freshwater marsh [ ] alkaline marsh [ ] alkali flat X other (specify):

Impounded portion of river system and retention / detention basin

Which best describes the hydrologic state of the wetland at the time of assessment?

[ ] ponded/inundated [ ] saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

[ ] long-duration X medium-duration [ ] short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes X no

Is the topographic basin of the wetland X distinct **or** [ ] indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1714	North			
2	1716	South			
3	1715	East			
4	1713	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: D204				**Date:** 03/08/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		3		Avg=9%	
Buffer submetric A: Percent of AA with Buffer	12			100% with buffer	
Buffer submetric B: Average Buffer Width	9			Avg=179.4 meters	
Buffer submetric C: Buffer Condition	6				
$D + [C \times (A \times B)^{½}]^{½}$ = **Attribute Score**		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		10.9	45.4		45.4
Hydrology					
Water Source		9		Ground water = dry season source	
Hydroperiod or Channel Stability		3			
Hydrologic Connectivity		12			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		24	66.7		66.7
Physical Structure					
Structural Patch Richness		6		6 patch types	
Topographic Complexity		12			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		18	75		75
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	12			4 Layers	
Plant Community submetric B: Number of Co-dominant species	6			6 co-dominant spp.	
Plant Community submetric C: Percent Invasion	3			50% invasion	
Plant Community Metric (*average of submetrics A-C*)		7			
Horizontal Interspersion and Zonation		12			
Vertical Biotic Structure		9			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		28	77.8		77.8
Overall AA Score (Average of Final Attribute Scores)				**66.2**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse	X	
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation	X	
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial	X	
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: G. Peracca

Assessment Area Name: D205

Assessment No.		**Date (mm/dd/yyyy):** 03/07/2012

Assessment Team Members for This AA

G. Peracca

C. Roberts

A. Langston

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted **X** Other

Which best describes the type of depressional wetland?

[ ] freshwater marsh [ ] alkaline marsh [ ] alkali flat **X** other (specify):

Retention / Detention Basin

Which best describes the hydrologic state of the wetland at the time of assessment?

[ ] ponded/inundated [ ] saturated soil, but no surface water **X** dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

[ ] long-duration [ ] medium-duration **X** short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes **X** no

Is the topographic basin of the wetland **X** distinct **or** [ ] indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	**Description**	**Latitude**	**Longitude**	**Datum**
1	1707	North			
2	1705	South			
3	1708	East			
4	1706	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: D205				**Date:** 03/07/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		3		Avg=2.5%	
Buffer submetric A: Percent of AA with Buffer	9			60% with buffer	
Buffer submetric B: Average Buffer Width	3			Avg=11.5 meters	
Buffer submetric C: Buffer Condition	3				
$D + [C \times (A \times B)^{1/2}]^{1/2}$ = **Attribute Score**		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		6.9	28.8		28.8
Hydrology					
Water Source		6			
Hydroperiod or Channel Stability		3			
Hydrologic Connectivity		12			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		21	58.3		58.3
Physical Structure					
Structural Patch Richness		3		2 patch types	
Topographic Complexity		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		6	25.0		25.0
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	6			1 Layer	
Plant Community submetric B: Number of Co-dominant species	3			4 Co-dominant spp.	
Plant Community submetric C: Percent Invasion	2			75% non-native spp.	
Plant Community Metric (*average of submetrics A-C*)		4			
Horizontal Interspersion and Zonation		6			
Vertical Biotic Structure		9			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		19	52.7		52.7
Overall AA Score (Average of Final Attribute Scores)				**41.2**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)	X	
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
Mowing AA but effected = not negative		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial	X	X
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
Poor drainage off adjacent commercial development visible sediment apron from failure in berm		
corner.		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: G. Peracca			
Assessment Area Name: D206			
Assessment No.		**Date (mm/dd/yyyy):** 03/07/2012	
Assessment Team Members for This AA			
A. Langston			
G. Peracca			
C. Roberts			

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Which best describes the type of depressional wetland?

[ ] freshwater marsh [ ] alkaline marsh [ ] alkali flat X other (specify):
Stormwater Retention/detention basin

Which best describes the hydrologic state of the wetland at the time of assessment?

[ ] ponded/inundated [ ] saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

[ ] long-duration [ ] medium-duration X short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes X no

Is the topographic basin of the wetland X distinct **or** [ ] indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1703	North			
2	1701	South			
3	1704	East			
4	1702	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: D206				**Date:** 03/07/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		3		Avg=3.3%	
Buffer submetric A: Percent of AA with Buffer	12			92% with buffer	
Buffer submetric B: Average Buffer Width	3			Avg=28.5 meters	
Buffer submetric C: Buffer Condition	6				
$D + [C \times (A \times B)^{1/2}]^{1/2}$ = **Attribute Score**		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		9	37.5		37.5
Hydrology					
Water Source		6			
Hydroperiod or Channel Stability		3			
Hydrologic Connectivity		12			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		21	58.3		58.3
Physical Structure					
Structural Patch Richness		3			
Topographic Complexity		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		6	25		25
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	6				
Plant Community submetric B: Number of Co-dominant species	3				
Plant Community submetric C: Percent Invasion	3				
Plant Community Metric (*average of submetrics A-C*)		4			
Horizontal Interspersion and Zonation		9			
Vertical Biotic Structure		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		19	52.7		52.7
Overall AA Score (Average of Final Attribute Scores)				**43.4**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: G. Peracca	
Assessment Area Name: D212	
Assessment No.	**Date (mm/dd/yyyy):** 03/06/2012

Assessment Team Members for This AA

C. Roberts

A. Langston

G. Peracca

AA Category:

[ ] Restoration   [ ] Mitigation   [ ] Impacted   X Other

Which best describes the type of depressional wetland?

[ ] freshwater marsh   [ ] alkaline marsh   [ ] alkali flat   X other (specify): Retention/detention basin

Which best describes the hydrologic state of the wetland at the time of assessment?

X ponded/inundated   [ ] saturated soil, but no surface water   [ ] dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

X long-duration   [ ] medium-duration   [ ] short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes   X no*

*but obviously hydrologically connected to the regional irrigation system

Is the topographic basin of the wetland X distinct **or** [ ] indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1689	North			
2	1687	South			
3	1690	East			
4	1688	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: D212				**Date:** 03/06/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		3		Avg=2%	
Buffer submetric A: Percent of AA with Buffer	12			100% with buffer	
Buffer submetric B: Average Buffer Width	3			Avg= 8.9 meters	
Buffer submetric C: Buffer Condition	3				
$D + [C \times (A \times B)^{1/2}]^{1/2}$ = **Attribute Score**		Raw: 7.2	Final: 30	Final Attribute Score = (Raw Score/24)100	30
Hydrology					
Water Source		3			
Hydroperiod or Channel Stability		3			
Hydrologic Connectivity		12			
Attribute Score		Raw: 18	Final: 50	Final Attribute Score = (Raw Score/36)100	50
Physical Structure					
Structural Patch Richness		6			
Topographic Complexity		9			
Attribute Score		Raw: 15	Final: 62.5	Final Attribute Score = (Raw Score/24)100	62.5
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	9			3 Layers	
Plant Community submetric B: Number of Co-dominant species	3			3 co-dominant spp.	
Plant Community submetric C: Percent Invasion	3			100% non-native spp.	
Plant Community Metric (*average of submetrics A-C*)		5			
Horizontal Interspersion and Zonation		12			
Vertical Biotic Structure		6			
Attribute Score		Raw: 23	Final: 63.9	Final Attribute Score = (Raw Score/36)100	63.9
Overall AA Score (Average of Final Attribute Scores)				**51.6**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	**Present and likely to have negative effect on AA**	**Significant negative effect on AA**
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	**Present and likely to have negative effect on AA**	**Significant negative effect on AA**
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control	X	
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: G. Peracca	
Assessment Area Name: D213	
Assessment No.	**Date (mm/dd/yyyy):** 03/06/2012

Assessment Team Members for This AA

A. Langston

G. Peracca

C. Roberts

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Which best describes the type of depressional wetland?

[ ] freshwater marsh [ ] alkaline marsh [ ] alkali flat X other (specify): Retention/detention basin

Which best describes the hydrologic state of the wetland at the time of assessment?

[ ] ponded/inundated [ ] saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

[ ] long-duration [ ] medium-duration X short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes X no

Is the topographic basin of the wetland X distinct **or** [ ] indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1683	North			
2	1685	South			
3	1684	East			
4	1686	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: D213				**Date:** 03/06/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		3		Avg=1.25%	
Buffer submetric A: Percent of AA with Buffer	12			100% with buffer	
Buffer submetric B: Average Buffer Width	6			Avg=70.6 meters	
Buffer submetric C: Buffer Condition	3				
$D + [C \times (A \times B)^{1/2}]^{1/2}$ **= Attribute Score**		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		8	33.3		33.3
Hydrology					
Water Source		3		Receives surface water from rain	
Hydroperiod or Channel Stability		3			
Hydrologic Connectivity		12			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		18	50		50
Physical Structure					
Structural Patch Richness		3		1 patch type	
Topographic Complexity		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		6	25		25
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	6			2 Layers	
Plant Community submetric B: Number of Co-dominant species	3			Co-dominant spp.	
Plant Community submetric C: Percent Invasion	3			66.7% non-native spp.	
Plant Community Metric (*average of submetrics A-C*)		4			
Horizontal Interspersion and Zonation		12			
Vertical Biotic Structure		9		Little to no entrained vegetation	
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		25	69.4		69.4
Overall AA Score (Average of Final Attribute Scores)				**44.4**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control	X	
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: A. Langston	
Assessment Area Name: D214	
Assessment No.	**Date (mm/dd/yyyy):** 03/06/2012

Assessment Team Members for This AA

C. Roberts

A. Langston

G. Peracca

AA Category:

[ ] Restoration [ ] Mitigation X Impacted X Other

Which best describes the type of depressional wetland?

[ ] freshwater marsh [ ] alkaline marsh [ ] alkali flat X other (specify): Retention/detention basin

Which best describes the hydrologic state of the wetland at the time of assessment?

X ponded/inundated [ ] saturated soil, but no surface water [ ] dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

X long-duration [ ] medium-duration [ ] short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes X no

Is the topographic basin of the wetland X distinct **or** [ ] indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1680, 1681	North			
2	1679	South			
3	1676	East			
4	1682	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: D214				**Date:** 03/06/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		3		Avg=0%	
Buffer submetric A: Percent of AA with Buffer	12			100% with buffer	
Buffer submetric B: Average Buffer Width	3			Avg=34.4 meters	
Buffer submetric C: Buffer Condition	3				
$D + [\,C \times (A \times B)^{½}\,]^{½}$ = **Attribute Score**		Raw	Final	Final Attribute Score = (Raw Score/24)100	30
		7.2	30		
Hydrology					
Water Source		3			
Hydroperiod or Channel Stability		3			
Hydrologic Connectivity		12			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	50
		18	50		
Physical Structure					
Structural Patch Richness		3			
Topographic Complexity		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	25
		6	25		
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	3				
Plant Community submetric B: Number of Co-dominant species	3				
Plant Community submetric C: Percent Invasion	12				
Plant Community Metric (*average of submetrics A-C*)		6			
Horizontal Interspersion and Zonation		3			
Vertical Biotic Structure		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	33
		12	33.3		
Overall AA Score (Average of Final Attribute Scores)				**34.6**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control	X	
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture	X	
Orchards/nurseries	X	X
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

Your Name: C. Julian	
CRAM Site ID: FB HST	
Assessment Area Name: R8	
Date (mm/dd/yyyy): 09/23/2011	
Assessment Team Members for This AA	
C. Roberts, C. Julian, J. Love, A. Langston	
Average Bankfull Width: 9 meters	
Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m): 100 meters	

Wetland Sub-type:

[ ] Confined X Non-confined

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial [ ] ephemeral X intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1230	Northeast			
2	1231	Southeast			
3	1228	Southwest			
4	1229	Northwest			

Scoring Sheet: Riverine Wetlands

AA Name: R8				**Date:** 09/23/2011	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity		12			
Buffer submetric A: Percent of AA with Buffer	12				
Buffer submetric B: Average Buffer Width	3				
Buffer submetric C: Buffer Condition	6			Disturbed soils, mix of native and non-native vegetation	
D + [C x (A x B)^{½}] ^{½} = **Attribute Score**		Raw	Final	Final Attribute Score = (Rawcore/24)100	75
		18	75		
Hydrology					
Water Source		6			
Hydroperiod or Channel Stability		9			
Hydrologic Connectivity		12			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	75
		27	75		
Physical Structure					
Structural Patch Richness		6			
Topographic Complexity		9			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	63
		15	63		
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	9			3 Layers	
Plant Community submetric B: Number of Co-dominant species	6			6 co-dominants	
Plant Community submetric C: Percent Invasion	9			17% invasion	
Plant Community Metric *(average of submetrics A-C)*		8			
Horizontal Interspersion and Zonation		6			
Vertical Biotic Structure		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	56
		20	56		
Overall AA Score (Average of Final Attribute Scores)				**67.3**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)	X	X
Flow obstructions (culverts, paved stream crossings)	X	X
Weir/drop structure, tide gates	X	X
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology	X	X
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management	X	
Excessive sediment or organic debris from watershed	X	X
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation	X	
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)	X	X
Dryland farming		
Intensive row-crop agriculture	X	X
Orchards/nurseries	X	X
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)	X	
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

Your Name: C. Roberts

CRAM Site ID: FB HST

Assessment Area Name: R63A

Date (mm/dd/yyyy): 09/29/2011

Assessment Team Members for This AA

C. Roberts, G. Peracca

Average Bankfull Width: 6 meters

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m):
100 meters

Wetland Sub-type:

X Confined [ ] Non-confined

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial X ephemeral [ ] intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1308	North			
2	1310	South			
3	1309	East			
4	1307	West			

Scoring Sheet: Riverine Wetlands

AA Name: R63A				**Date:** 09/29/2011	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity		12			
Buffer submetric A: Percent of AA with Buffer	12				
Buffer submetric B: Average Buffer Width	12				
Buffer submetric C: Buffer Condition	9				
D + [C x (A x B)^{½}] ^{½} **= Attribute Score**		Raw	Final	Final Attribute Score = (Rawcore/24)100	
		22	93		93
Hydrology					
Water Source		9			
Hydroperiod or Channel Stability		12			
Hydrologic Connectivity		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		27	75		75
Physical Structure					
Structural Patch Richness		3			
Topographic Complexity		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		9	38		38
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	9			3 layers	
Plant Community submetric B: Number of Co-dominant species	6			7 co-dominants	
Plant Community submetric C: Percent Invasion	3			57% non-native spp.	
Plant Community Metric *(average of submetrics A-C)*		6			
Horizontal Interspersion and Zonation		6			
Vertical Biotic Structure		12			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		27	67		67
Overall AA Score (Average of Final Attribute Scores)				**68.3**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
RR levee; probably not very significant; AA seems to get adequate water		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)	X	
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management	X	
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
BNSF manages ROW		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species	X	
Pesticide application or vector control	X	
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		
BNSF manages veg. in ROW		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	X
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

Your Name: G. Peracca
CRAM Site ID: FB HST
Assessment Area Name: R66
Date (mm/dd/yyyy): 09/29/2011

Assessment Team Members for This AA
C. Roberts, G. Peracca

Average Bankfull Width:

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m):
100 meters

Wetland Sub-type:

X Confined [ ] Non-confined

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial [ ] ephemeral X intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1316	North			
2	1315	South			
3	1317, 1318	East			
4	1319, 1320	West			

Scoring Sheet: Riverine Wetlands

AA Name: R66				**Date:** 09/29/2011	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity		12			
Buffer submetric A: Percent of AA with Buffer	12			100%	
Buffer submetric B: Average Buffer Width	9			Avg =140 meters	
Buffer submetric C: Buffer Condition	9				
$D + [C \times (A \times B)^{½}]^{½}$ **= Attribute Score**		Raw	Final	Final Attribute Score = (Rawcore/24)100	90
		22	90		
Hydrology					
Water Source		9			
Hydroperiod or Channel Stability		9			
Hydrologic Connectivity		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	67
		24	67		
Physical Structure					
Structural Patch Richness		6			
Topographic Complexity		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	50
		12	50		
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	B (9)			3 Layers	
Plant Community submetric B: Number of Co-dominant species	B (9)			8 co-dominants	
Plant Community submetric C: Percent Invasion	D (3)			57% invasion	
Plant Community Metric *(average of submetrics A-C)*		7			
Horizontal Interspersion and Zonation		9			
Vertical Biotic Structure		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	61
		22	67		
Overall AA Score (Average of Final Attribute Scores)				**67**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)	X	
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)	X	
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management	X	
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
RR ROW veg. management = removal of plants along rairlroad berm using herbicides.		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control	X	
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		
See physical structure attribute discussion re: herbicides in RR ROW		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	X
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

Your Name: C. Roberts
CRAM Site ID: FB HST
Assessment Area Name: R71A
Date (mm/dd/yyyy): 09/20/2011

Assessment Team Members for This AA

C. Roberts, C. Julian, J. Love, A. Langston

Average Bankfull Width: 4 meters

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m):
100 meters

Wetland Sub-type:

X Confined [ ] Non-confined

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial [ ] ephemeral X intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1189	North			
2	1191	South			
3	1190	East			
4	1192	West			

Scoring Sheet: Riverine Wetlands

AA Name: R71A				**Date:** 09/20/2011	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity		12		No Breaks	
Buffer submetric A: Percent of AA with Buffer	12				
Buffer submetric B: Average Buffer Width	12				
Buffer submetric C: Buffer Condition	9				
$D + [C \times (A \times B)^{½}]^{½}$ = **Attribute Score**		Raw	Final	Final Attribute Score = (Rawcore/24)100	
		22	93		93
Hydrology					
Water Source		12			
Hydroperiod or Channel Stability		9			
Hydrologic Connectivity		9			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		30	83		83
Physical Structure					
Structural Patch Richness		3			
Topographic Complexity		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		9	38		38
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	6			2 layers	
Plant Community submetric B: Number of Co-dominant species	3			3 co-dominants	
Plant Community submetric C: Percent Invasion	6			33% non-native spp.	
Plant Community Metric *(average of submetrics A-C)*		5			
Horizontal Interspersion and Zonation		3			
Vertical Biotic Structure		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		11	31		31
Overall AA Score (Average of Final Attribute Scores)				**61.3**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)	X	
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology	X	
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)	X	
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse	X	
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming	X	
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

Your Name: J. Love
CRAM Site ID: FB HST
Assessment Area Name: R146
Date (mm/dd/yyyy): 09/22/2011

Assessment Team Members for This AA
C. Roberts, C. Julian, J. Love, A. Langston

Average Bankfull Width:

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m):
100 meters

Wetland Sub-type:

X Confined [ ] Non-confined

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial [ ] ephemeral X intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1213	North			
2	1215	South			
3	1214	East			
4	NO ACCESS	West			

Scoring Sheet: Riverine Wetlands

AA Name: R146				**Date:** 09/22/2011	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity		3			
Buffer submetric A: Percent of AA with Buffer	9			RR on W is a main line with w/ riprap which we didn't count as buffer. E side is dirt road	
Buffer submetric B: Average Buffer Width	3				
Buffer submetric C: Buffer Condition	3				
D + [C x (A x B)^{½}] ^{½} = **Attribute Score**		Raw	Final	Final Attribute Score = (Rawcore/24)100	29
		7	29		
Hydrology					
Water Source		9			
Hydroperiod or Channel Stability		6			
Hydrologic Connectivity		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	58
		21	58		
Physical Structure					
Structural Patch Richness		3			
Topographic Complexity		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	38
		9	38		
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	9			3 Layers	
Plant Community submetric B: Number of Co-dominant species	3			4 co-dominants	
Plant Community submetric C: Percent Invasion	3			50% invasion	
Plant Community Metric *(average of submetrics A-C)*		5			
Horizontal Interspersion and Zonation		6			
Vertical Biotic Structure		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	47
		17	47		
Overall AA Score (Average of Final Attribute Scores)				**43**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	X
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
RR is built on a levee		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)	X	X
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management	X	X
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)	X	X
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse	X	
Comments		
Grading/compaction due to roads adjacent; veg removal seen on site; herbicides from orchards		
trash		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species	X	
Pesticide application or vector control	X	X
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		
Herbicides from orchards; veg removal seen on-site		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	X
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	X
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
Orchards; RR adjacent to AA and SR 43 nearby		

Basic Information Sheet: Riverine Wetlands

Your Name: C. Roberts
CRAM Site ID: FB HST
Assessment Area Name: R149
Date (mm/dd/yyyy): 09/20/2011

Assessment Team Members for This AA
C. Roberts, C. Julian, J. Love, A. Langston

Average Bankfull Width: 9 meters

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m):
100 meters

Wetland Sub-type:

[ ] Confined X Non-confined

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial [ ] ephemeral X intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1193	North			
2	1194	South			
3	1195	East			
4	1196	West			

Scoring Sheet: Riverine Wetlands

AA Name: R149				**Date:** 09/20/2011	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity		12		70m break upstream	
Buffer submetric A: Percent of AA with Buffer	3			functionally no buffer	
Buffer submetric B: Average Buffer Width	3				
Buffer submetric C: Buffer Condition	3				
$D + [C \times (A \times B)^{1/2}]^{1/2}$ **= Attribute Score**		Raw	Final	Final Attribute Score = (Rawcore/24)100	
		15	63		63
Hydrology					
Water Source		6			
Hydroperiod or Channel Stability		9			
Hydrologic Connectivity		9			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		24	67		67
Physical Structure					
Structural Patch Richness		3			
Topographic Complexity		9			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		12	50		50
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	9			3 layers	
Plant Community submetric B: Number of Co-dominant species	6			6 co-dominants	
Plant Community submetric C: Percent Invasion	9			17% invasion	
Plant Community Metric *(average of submetrics A-C)*		8			
Horizontal Interspersion and Zonation		9			
Vertical Biotic Structure		9			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		26	72		72
Overall AA Score (Average of Final Attribute Scores)				**63**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)	X	
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
Channel modified for drainage, but still relatively natural		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management	X	
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
Managing vegetation on levees		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris	X	
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	X
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

Your Name: C. Roberts

CRAM Site ID: FB HST

Assessment Area Name: R150

Date (mm/dd/yyyy): 09/26/2011

Assessment Team Members for This AA

J. Whitfield, A. Langston, G. Peracca

Average Bankfull Width: 9.5 meters

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m):
100 meters

Wetland Sub-type:

X Confined [ ] Non-confined

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial [ ] ephemeral X intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1241	NE			
2	1242	NW			
3	1246	SE			
4	1244	SW			

Scoring Sheet: Riverine Wetlands

AA Name: R150				**Date:** 09/26/2011	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity		12			
Buffer submetric A: Percent of AA with Buffer	12				
Buffer submetric B: Average Buffer Width	3				
Buffer submetric C: Buffer Condition	6				
D + [C x (A x B)^{½}] ^{½} = **Attribute Score**		Raw 18	Final 75	Final Attribute Score = (Rawcore/24)100	75
Hydrology					
Water Source		6			
Hydroperiod or Channel Stability		9			
Hydrologic Connectivity		9			
Attribute Score		Raw 24	Final 67	Final Attribute Score = (Raw Score/36)100	67
Physical Structure					
Structural Patch Richness		3			
Topographic Complexity		9			
Attribute Score		Raw 12	Final 50	Final Attribute Score = (Raw Score/24)100	50
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	9			3 Layers	
Plant Community submetric B: Number of Co-dominant species	3			6 co-dominants	
Plant Community submetric C: Percent Invasion	9			16% invasion	
Plant Community Metric *(average of submetrics A-C)*		7			
Horizontal Interspersion and Zonation		6			
Vertical Biotic Structure		6			
Attribute Score		Raw 19	Final 53	Final Attribute Score = (Raw Score/36)100	53
Overall AA Score (Average of Final Attribute Scores)				**61.3**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)	X	
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)	X	
Dike/levees	X	X
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
Leveed AA		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management	X	
Excessive sediment or organic debris from watershed	X	X
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse	X	
Comments		
Tree cutting see biotic structures		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal	X	
Removal of woody debris	X	
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		
Vegetation management		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

Your Name: G. Peracca

CRAM Site ID: FB HST

Assessment Area Name: R157A

Date (mm/dd/yyyy): 09/28/2011

Assessment Team Members for This AA

C. Roberts, A. Langston, G. Peracca

Average Bankfull Width: 140 meters

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m):
200 meters

Wetland Sub-type:

X Confined [ ] Non-confined

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Did the river/stream have flowing water at the time of the assessment? X yes [ ] no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

X perennial [ ] ephemeral [ ] intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1288	North			
2	n/a	South			
3	1290	East			
4	1287	West			

Scoring Sheet: Riverine Wetlands

AA Name: R157A				**Date:** 09/28/2011	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity		9			
Buffer submetric A: Percent of AA with Buffer	12				
Buffer submetric B: Average Buffer Width	6				
Buffer submetric C: Buffer Condition	3			Urban park landscape	
D + [C x (A x B)^{½}] ^{½} = **Attribute Score**		Raw: 14	Final: 59	Final Attribute Score = (Rawcore/24)100	59
Hydrology					
Water Source		6			
Hydroperiod or Channel Stability		9			
Hydrologic Connectivity		9			
Attribute Score		Raw: 24	Final: 67	Final Attribute Score = (Raw Score/36)100	67
Physical Structure					
Structural Patch Richness		3			
Topographic Complexity		12			
Attribute Score		Raw: 15	Final: 63	Final Attribute Score = (Raw Score/24)100	63
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	12			4 layers	
Plant Community submetric B: Number of Co-dominant species	9			9 co-dominant spp.	
Plant Community submetric C: Percent Invasion	12			0% non-native spp.	
Plant Community Metric *(average of submetrics A-C)*		11			
Horizontal Interspersion and Zonation		9			
Vertical Biotic Structure		6			
Attribute Score		Raw: 26	Final: 72	Final Attribute Score = (Raw Score/36)100	72
Overall AA Score (Average of Final Attribute Scores)				**65.3**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse	X	
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation	X	X
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		
Human visitation impact is related to adjacent urban park.		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential	X	
Industrial/commercial	X	
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)	X	X
Passive recreation (bird-watching, hiking, etc.)	X	
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)	X	
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
Urban park is related to human visitation above in Biotic Structure Attribute.		

Basic Information Sheet: Riverine Wetlands

Your Name: C. Roberts
CRAM Site ID: FB HST
Assessment Area Name: R160
Date (mm/dd/yyyy): 09/29/2011

Assessment Team Members for This AA
C. Roberts, A. Langston, G. Peracca

Average Bankfull Width: 130 meters

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m):
300 meters

Wetland Sub-type:

X Confined [ ] Non-confined

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Did the river/stream have flowing water at the time of the assessment? X yes [ ] no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

X perennial [ ] ephemeral [ ] intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	N/A	North			
2	N/A	South			
3	1291	East			
4	1292	West			
5	1293	General			
6	1294	General			

Scoring Sheet: Riverine Wetlands

AA Name: R160				**Date:** 09/28/2011	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity		12			
Buffer submetric A: Percent of AA with Buffer	12				
Buffer submetric B: Average Buffer Width	3			Average = 45m	
Buffer submetric C: Buffer Condition	6				
$D + [C \times (A \times B)^{1/2}]^{1/2}$ **= Attribute Score**		Raw	Final	Final Attribute Score = (Rawcore/24)100	75
		18	75		
Hydrology					
Water Source		6			
Hydroperiod or Channel Stability		6			
Hydrologic Connectivity		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	50
		18	50		
Physical Structure					
Structural Patch Richness		3			
Topographic Complexity		9			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	50
		12	50		
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	9			3 layers	
Plant Community submetric B: Number of Co-dominant species	6			6 co-dominant spp.	
Plant Community submetric C: Percent Invasion	12			0% non-native spp.	
Plant Community Metric *(average of submetrics A-C)*		9			
Horizontal Interspersion and Zonation		6			
Vertical Biotic Structure		9			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	67
		24			
Overall AA Score (Average of Final Attribute Scores)				**60.5**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
Leveed		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)	X	X
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed	X	
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse	X	
Comments		
Grading active on opposite bank. Oil wells in vicinity.		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential	X	X
Industrial/commercial	X	X
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	X
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)	X	
Passive recreation (bird-watching, hiking, etc.)	X	
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)	X	
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

Your Name: A. Langston	
CRAM Site ID: FB HST	
Assessment Area Name: R203	
Date (mm/dd/yyyy): 03/08/2012	

Assessment Team Members for This AA

A. Langston, G. Peracca, C. Roberts, J. Whitfield

Average Bankfull Width: 2.7m

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m): 100 m

Wetland Sub-type:

X Confined [ ] Non-confined

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial [ ] ephemeral X intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1721	South/East			
2	1722	North/East			
3	1723	South/West			
4	1724	North/West			

Scoring Sheet: Riverine Wetlands

AA Name: R203				**Date:** 03/08/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity		3			
Buffer submetric A: Percent of AA with Buffer	3			No buffer	
Buffer submetric B: Average Buffer Width	3			Avg=4 meters	
Buffer submetric C: Buffer Condition	3				
$D + [C \times (A \times B)^{1/2}]^{1/2}$ **= Attribute Score**		Raw	Final	Final Attribute Score = (Raw score/24)100	25
		6	25		
Hydrology					
Water Source		3			
Hydroperiod or Channel Stability		3			
Hydrologic Connectivity		3		Entrenchment ratio =1.20	
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	25
		9	25		
Physical Structure					
Structural Patch Richness		3		1 patch type	
Topographic Complexity		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	25
		6	25		
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	6			1 layer	
Plant Community submetric B: Number of Co-dominant species	3			4 co-dominant spp.	
Plant Community submetric C: Percent Invasion	12			0% invasive spp.	
Plant Community Metric *(average of submetrics A-C)*		7			
Horizontal Interspersion and Zonation		3			
Vertical Biotic Structure		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	36.1
		13	36.1		
Overall AA Score (Average of Final Attribute Scores)				**27.8**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
Man-made feature built and managed by the stressors highlighted in bold, which don't have		
a negative effect on AA but define features.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)	X	
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
Located in heavy agricultural area with no buffer, but direct impacts of physical structure		
Stressors not evident.		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
Adjacent to BNSF railroad.		

Basic Information Sheet: Riverine Wetlands

Your Name: G. Peracca	
CRAM Site ID: FB HST	
Assessment Area Name: R205	
Date (mm/dd/yyyy): 03/08/2012	
Assessment Team Members for This AA	
A. Langston, G. Peracca, C. Roberts, J. Whitfield	
Average Bankfull Width: 9m	
Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m): 100 m	

Wetland Sub-type:

X Confined [ ] Non-confined

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial [ ] ephemeral X intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1717	South/West			
2	1718	North/West			
3	1720	South/East			
4	1719	North/East			

Scoring Sheet: Riverine Wetlands

AA Name: R205				**Date**: 03/08/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity		12			
Buffer submetric A: Percent of AA with Buffer	3			No buffer. Road too narrow	
Buffer submetric B: Average Buffer Width	3			Avg=4 meters	
Buffer submetric C: Buffer Condition	3				
$D + [C \times (A \times B)^{1/2}]^{1/2}$ **= Attribute Score**		Raw	Final	Final Attribute Score = (Raw score/24)100	62.5
		15	62.5		
Hydrology					
Water Source		6			
Hydroperiod or Channel Stability		3			
Hydrologic Connectivity		3		Entrenchment Ratio=1.20	
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	33.3
		12	33.3		
Physical Structure					
Structural Patch Richness		3		1 patch type	
Topographic Complexity		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	25
		6	25		
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	6				
Plant Community submetric B: Number of Co-dominant species	3			3 co-dominant spp.	
Plant Community submetric C: Percent Invasion	6			33% invasive spp.	
Plant Community Metric *(average of submetrics A-C)*		5			
Horizontal Interspersion and Zonation		3			
Vertical Biotic Structure		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	30.6
		11	30.6		
Overall AA Score (Average of Final Attribute Scores)				**37.9**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)	X	
Flow obstructions (culverts, paved stream crossings)	X	
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)	X	
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed	X	
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

Your Name: A. Langston
CRAM Site ID: FB HST
Assessment Area Name: R208
Date (mm/dd/yyyy): 03/07/2012

Assessment Team Members for This AA
A. Langston, G. Peracca, C. Roberts

Average Bankfull Width: 12m

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m): 120m

Wetland Sub-type:

X Confined [ ] Non-confined

AA Category:

[ ] Restoration [ ] Mitigation X Impacted [ ] Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial [ ] ephemeral X intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1695	North/West			
2	1696	North/East			
3	1698,1699	South/West			
4	1697	South/East			

Scoring Sheet: Riverine Wetlands

AA Name: R208				**Date:** 03/07/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity		12			
Buffer submetric A: Percent of AA with Buffer	12			100% with buffer	
Buffer submetric B: Average Buffer Width	3			Avg=9.6m	
Buffer submetric C: Buffer Condition	3				
$D + [C \times (A \times B)^{1/2}]^{1/2}$ = **Attribute Score**		Raw 16.2	Final 67.5	Final Attribute Score = (Raw score/24)100	67.5
Hydrology					
Water Source		6			
Hydroperiod or Channel Stability		9			
Hydrologic Connectivity		9		Entrenchment Ratio=1.98	
Attribute Score		Raw 24	Final 66.7	Final Attribute Score = (Raw Score/36)100	66.7
Physical Structure					
Structural Patch Richness		6		1 patch type	
Topographic Complexity		9			
Attribute Score		Raw 15	Final 62.5	Final Attribute Score = (Raw Score/24)100	62.5
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	9			1 layer	
Plant Community submetric B: Number of Co-dominant species	6			1 co-dominant sp.	
Plant Community submetric C: Percent Invasion	9			0% non-native spp.	
Plant Community Metric *(average of submetrics A-C)*		8			
Horizontal Interspersion and Zonation		9			
Vertical Biotic Structure		9			
Attribute Score		Raw 26	Final 72.2	Final Attribute Score = (Raw Score/36)100	72.2
Overall AA Score (Average of Final Attribute Scores)				**67.2**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

Your Name: A. Langston
CRAM Site ID: FB HST
Assessment Area Name: R209
Date (mm/dd/yyyy): 03/07/2012

Assessment Team Members for This AA
A. Langston, G. Peracca, C. Roberts

Average Bankfull Width: 6m

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m): 100 m

Wetland Sub-type:

X Confined [ ] Non-confined

AA Category:

[ ] Restoration [ ] Mitigation X Impacted [ ] Other

Did the river/stream have flowing water at the time of the assessment? X yes [ ] no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

X perennial [ ] ephemeral [ ] intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	N/A	North			
2	N/A	South			
3	1694	East			
4	1693	West			

Scoring Sheet: Riverine Wetlands

AA Name: R209				**Date:** 03/07/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity		12			
Buffer submetric A: Percent of AA with Buffer	9			50% with buffer	
Buffer submetric B: Average Buffer Width	3			Avg=8 meters	
Buffer submetric C: Buffer Condition	3				
$D + [\, C \times (A \times B)^{1/2} \,]^{1/2}$ = **Attribute Score**		Raw	Final	Final Attribute Score = (Raw score/24)100	
		15.9	66.3		66.3
Hydrology					
Water Source		6		Isolated from surrounding canals	
Hydroperiod or Channel Stability		3		Fed by pumped groundwater.	
Hydrologic Connectivity		6		Entrenchment Ratio=1.39	
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		15	41.7		41.7
Physical Structure					
Structural Patch Richness		3		1 patch type	
Topographic Complexity		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		9	37.5		37.5
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	6			1 layer	
Plant Community submetric B: Number of Co-dominant species	3			1 co-dominant sp.	
Plant Community submetric C: Percent Invasion	12			0% invasion	
Plant Community Metric *(average of submetrics A-C)*		7			
Horizontal Interspersion and Zonation		3			
Vertical Biotic Structure		3			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		13	36.1		36.1
Overall AA Score (Average of Final Attribute Scores)				**45.4**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)	X	
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)	X	
Trash or refuse		
Comments		
Nutrient impaired (sulfur smell within feature) potential inputs picked up from adjacent feedlot.		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture	X	X
Orchards/nurseries		
Commercial feedlots	X	
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)	X	
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
Agriculture occupies 100% of surrounding land uses. Even though the feature was created for agriculture		
it is significantly negatively affected by the Intensive row-crop agriculture, specifically.		

Basic Information Sheet: Riverine Wetlands

Your Name: A. Langston
CRAM Site ID: FB HST
Assessment Area Name: R211
Date (mm/dd/yyyy): 03/05/2012

Assessment Team Members for This AA

A. Langston, G. Peracca, C. Roberts

Average Bankfull Width: 8 meters

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m): 100 m

Wetland Sub-type:

X Confined [ ] Non-confined

AA Category:

[ ] Restoration [ ] Mitigation X Impacted [ ] Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial [ ] ephemeral X intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1674	Southeast			
2	1675	Northeast			
3	N/A	East			
4	N/A	West			

Scoring Sheet: Riverine Wetlands

<table>
<tr><td colspan="3">AA Name: R211</td><td colspan="2">Date: 03/05/2012</td></tr>
<tr><th colspan="2">Attributes and Metrics</th><th>Scores</th><th colspan="2">Comments</th></tr>
<tr><td colspan="3">Buffer and Landscape Context</td><td colspan="2"></td></tr>
<tr><td colspan="2">Landscape Connectivity</td><td>6</td><td colspan="2"></td></tr>
<tr><td>Buffer submetric A: Percent of AA with Buffer</td><td>12</td><td rowspan="3"></td><td colspan="2">100% with buffer</td></tr>
<tr><td>Buffer submetric B: Average Buffer Width</td><td>3</td><td colspan="2">Avg =5.4 meters</td></tr>
<tr><td>Buffer submetric C: Buffer Condition</td><td>3</td><td colspan="2"></td></tr>
<tr><td colspan="2">D + [C x (A x B)^½] ^½ = Attribute Score</td><td>Raw: 10.2 / Final: 42.5</td><td>Final Attribute Score = (Rawcore/24)100</td><td>42.5</td></tr>
<tr><td colspan="3">Hydrology</td><td colspan="2"></td></tr>
<tr><td colspan="2">Water Source</td><td>6</td><td colspan="2"></td></tr>
<tr><td colspan="2">Hydroperiod or Channel Stability</td><td>3</td><td colspan="2">Not a natural feature</td></tr>
<tr><td colspan="2">Hydrologic Connectivity</td><td>6</td><td colspan="2">Entrenchment Ratio=1.45</td></tr>
<tr><td colspan="2">Attribute Score</td><td>Raw: 15 / Final: 41.7</td><td>Final Attribute Score = (Raw Score/36)100</td><td>41.7</td></tr>
<tr><td colspan="3">Physical Structure</td><td colspan="2"></td></tr>
<tr><td colspan="2">Structural Patch Richness</td><td>6</td><td colspan="2">4 patch types</td></tr>
<tr><td colspan="2">Topographic Complexity</td><td>9</td><td colspan="2"></td></tr>
<tr><td colspan="2">Attribute Score</td><td>Raw: 15 / Final: 62.5</td><td>Final Attribute Score = (Raw Score/24)100</td><td>62.5</td></tr>
<tr><td colspan="3">Biotic Structure</td><td colspan="2"></td></tr>
<tr><td>Plant Community submetric A: Number of Plant Layers</td><td>6</td><td rowspan="3"></td><td colspan="2">1 layer</td></tr>
<tr><td>Plant Community submetric B: Number of Co-dominant species</td><td>3</td><td colspan="2">1 dominant sp.</td></tr>
<tr><td>Plant Community submetric C: Percent Invasion</td><td>12</td><td colspan="2">0% invasion</td></tr>
<tr><td colspan="2">Plant Community Metric (average of submetrics A-C)</td><td>7</td><td colspan="2"></td></tr>
<tr><td colspan="2">Horizontal Interspersion and Zonation</td><td>3</td><td colspan="2"></td></tr>
<tr><td colspan="2">Vertical Biotic Structure</td><td>3</td><td colspan="2"></td></tr>
<tr><td colspan="2">Attribute Score</td><td>Raw: 13 / Final: 36.1</td><td>Final Attribute Score = (Raw Score/36)100</td><td>36.1</td></tr>
<tr><td colspan="3">Overall AA Score (Average of Final Attribute Scores)</td><td colspan="2">45.7</td></tr>
</table>

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)	X	
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology	X	
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)	X	
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse	X	
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control	X	
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	
Commercial feedlots	X	
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

Your Name: G. Peracca	
CRAM Site ID: FB HST	
Assessment Area Name: R212	
Date (mm/dd/yyyy): 03/05/2012	

Assessment Team Members for This AA

C. Roberts, A. Langston, G. Peracca

Average Bankfull Width: 8 meters

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m): 100 m

Wetland Sub-type:

X Confined [ ] Non-confined

AA Category:

[ ] Restoration [ ] Mitigation X Impacted [ ] Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial [ ] ephemeral X intermittent *artificially filled for ag.

Photo Identification Numbers and Description:

	Photo ID No.	Description (facing)	Latitude	Longitude	Datum
1	1670	SE			
2	1671	NE			
3	1672	SW			
4	1673	NW			

Scoring Sheet: Riverine Wetlands

AA Name: R212				**Date:** 03/05/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity		12			
Buffer submetric A: Percent of AA with Buffer	12			100% with buffer	
Buffer submetric B: Average Buffer Width	3			Avg=10.6 meters	
Buffer submetric C: Buffer Condition	3			Buffer = unvegetated	
$D + [C \times (A \times B)^{1/2}]^{1/2}$ **= Attribute Score**		Raw 16.2	Final 67.5	Final Attribute Score = (Rawcore/24)100	67.5
Hydrology					
Water Source		6		20% of AA adjacent to active ag	
Hydroperiod or Channel Stability		3			
Hydrologic Connectivity		6		Entrenchment Ratio=1.4	
Attribute Score		Raw 15	Final 41.7	Final Attribute Score = (Raw Score/36)100	41.7
Physical Structure					
Structural Patch Richness		3			
Topographic Complexity		3			
Attribute Score		Raw 6	Final 25	Final Attribute Score = (Raw Score/24)100	25
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	6			1 Layer	
Plant Community submetric B: Number of Co-dominant species	3			1 co-dominant sp.	
Plant Community submetric C: Percent Invasion	12			0% invasion	
Plant Community Metric *(average of submetrics A-C)*		7			
Horizontal Interspersion and Zonation		3			
Vertical Biotic Structure		3			
Attribute Score		Raw 13	Final 36.1	Final Attribute Score = (Raw Score/36)100	36.1
Overall AA Score (Average of Final Attribute Scores)				**42.6**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)	X	
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology	X	X
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)	X	
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control	X	
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture	X	
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

Your Name: A. Langston
CRAM Site ID: FB HST
Assessment Area Name: R213
Date (mm/dd/yyyy): 03/05/2012
Assessment Team Members for This AA
C. Roberts, A. Langston, G. Peracca
Average Bankfull Width: 6 m
Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m): 100 m

Wetland Sub-type:

X Confined [ ] Non-confined

AA Category:

[ ] Restoration [ ] Mitigation X Impacted [ ] Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial [ ] ephemeral X intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description (facing)	Latitude	Longitude	Datum
1	1665	NE			
2	1666	NW			
3	1667	SW			
4	1668	SE			

Scoring Sheet: Riverine Wetlands

AA Name: R213				**Date:** 03/05/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity		12			
Buffer submetric A: Percent of AA with Buffer	9			50% with buffer	
Buffer submetric B: Average Buffer Width	3			Avg=11 meter	
Buffer submetric C: Buffer Condition	3				
D + [C x (A x B)^{½}] ^{½} = **Attribute Score**		Raw 15.9	Final 66.3	Final Attribute Score = (Rawcore/24)100	66.3
Hydrology					
Water Source		6			
Hydroperiod or Channel Stability		3		Hydromodification	
Hydrologic Connectivity		6		Entrenchment Ratio=1.46	
Attribute Score		Raw 15	Final 41.7	Final Attribute Score = (Raw Score/36)100	41.7
Physical Structure					
Structural Patch Richness		3			
Topographic Complexity		3			
Attribute Score		Raw 6	Final 25	Final Attribute Score = (Raw Score/24)100	25
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	6			1 Layer	
Plant Community submetric B: Number of Co-dominant species	3			2 co-dominant spp.	
Plant Community submetric C: Percent Invasion	12			0% invasion	
Plant Community Metric *(average of submetrics A-C)*		7			
Horizontal Interspersion and Zonation		3			
Vertical Biotic Structure		3			
Attribute Score		Raw 13	Final 36.1	Final Attribute Score = (Raw Score/36)100	36.1
Overall AA Score (Average of Final Attribute Scores)				**42.3**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology	X	
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)	X	
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control	X	
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture	X	
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

Your Name: J.n Whitfield
CRAM Site ID: FB HST
Assessment Area Name: R220
Date (mm/dd/yyyy): 03/09/2012

Assessment Team Members for This AA
A. Langston, G. Peracca, C. Roberts, J. Whitfield

Average Bankfull Width: varies; approximately 13 m - 20 m

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m): 200 m

Wetland Sub-type:

[ ] Confined X Non-confined

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Did the river/stream have flowing water at the time of the assessment? [ ] yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. Perennial streams conduct water all year long, whereas ephemeral streams conduct water only during and immediately following precipitation events. Intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

[ ] perennial [ ] ephemeral X intermittent

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1725	North			
2	1726	South			
3	1727	East			
4	1728	West			

Scoring Sheet: Riverine Wetlands

AA Name: R220				**Date:** 03/09/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity		12			
Buffer submetric A: Percent of AA with Buffer	9			50% with buffer	
Buffer submetric B: Average Buffer Width	6			Avg=112.5 meter	
Buffer submetric C: Buffer Condition	6				
D + [C x (A x B)^{½}] ^{½} = **Attribute Score**		Raw	Final	Final Attribute Score = (Raw score/24)100	77.5
		18.6	77.5		
Hydrology					
Water Source		6			
Hydroperiod or Channel Stability		9			
Hydrologic Connectivity		12		Entrenchment Ratio= 3.82	
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	75
		18	75		
Physical Structure					
Structural Patch Richness		6		6 patch types	
Topographic Complexity		12			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	75
		18	75		
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	9			3 Layers	
Plant Community submetric B: Number of Co-dominant species	6			8 co-dominant spp.	
Plant Community submetric C: Percent Invasion	9			25% invasion	
Plant Community Metric *(average of submetrics A-C)*		8			
Horizontal Interspersion and Zonation		9		½ AA = 12; ½ AA =6. Avg=9	
Vertical Biotic Structure		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	63.9
		23	63.9		
Overall AA Score (Average of Final Attribute Scores)				**72.9**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)	X	
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation	X	
Predation and habitat destruction by non-native vertebrates (e.g., Virginia opossum and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)	X	
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information: Individual Vernal Pool

CRAM Site ID: APN: 331-080-001

Project Site ID: Fresno to Bakersfield HST

Assessment Area Name: V62A

Project Name: Fresno to Bakersfield HST	**Date (m/d/y)**	9	29	11

Assessment Team Members for This AA

G. Peracca

C. Roberts

Wetland Category:

X Natural □ Constructed □ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

□ entire wetland □ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

□ ponded/inundated □ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

□ long-duration □ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

□ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1314	North			
2	1312	South			
3	1313	East			
4	1311	West			
5					
6					

Comments:

*April 2012: updated using new Individual VP Module (V. 6.0).
CRAM score based on old VP module V. 5.0.3 = 65.5.
New CRAM score = 72.6

Scoring Sheet: Individual Vernal Pools

AA Name: V62A					**(m/d/y)**	09/29/2011
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			B	9	Avg=18%	
	Alpha.	Numeric				
(B): Percent of AA with Buffer	A	12			100% with buffer	
(C): Average Buffer Width	B	9			Avg=186m	
(D): Buffer Condition	B	9				
Initial Attribute Score $= A + [D \times (B \times C)^{½}]^{½}$				18.7	Final Attribute Score = (Initial Score/24) x 100	77.8
Hydrology						
Water Source			A	12		
Hydroperiod			A	12		
Hydrologic Connectivity			B	9		
Initial Attribute Score				33	Final Attribute Score = (Initial Score/36) x 100	91.7
Physical Structure						
Structural Patch Richness			C	6	3 patch types	
Topographic Complexity			C	6		
Initial Attribute Score				12	Final Attribute Score = (Initial Score/24) x 100	50
Biotic Structure						
Horizontal Interspersion and Zonation			B	9		
Community composition submetric	Alpha.	Numeric				
A: Number of Co-dominants	B	9			4 co-dominant spp.	
Community composition submetric B: Percent Non-native	A	12			0% non-native spp.	
Community Composition submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Composition Metric (*numeric average of submetrics A-C*)				8		
Initial Attribute Score				17	Final Attribute Score = (Initial Score/24) x 100	70.8
Overall AA Score (Average of Final Attribute Scores)					**72.6**	

Worksheet 8: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
Levee = railroad berm upstream of AA, not significant stressor- AA appears to be receiving sufficient water.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**	X	
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management	X	
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
Veg management occurs along RR ROW but ROW is separated from AA by bermand gravel road (it is just at 50 m boundary) and veg. in AA is all native, undisturbed.		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species	X	
Pesticide application or vector control	X	
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		
See comment for Physical Structure Attribute re: veg mgmt along RR ROW.		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	X
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
Trans. Corridor = RR and Hwy. They have had effect on landscape connectivity for site.		

Basic Information: Individual Vernal Pool

CRAM Site ID: APN: 331-100-030

Project Site ID: Fresno to Bakersfield HST

Assessment Area Name: V65

Project Name: Fresno to Bakersfield HST	**Date (m/d/y)**	9	29	11

Assessment Team Members for This AA

G. Peracca

C. Roberts

Wetland Category:

X Natural □ Constructed □ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

□ entire wetland □ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

□ ponded/inundated □ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

□ long-duration □ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

□ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1324	North			
2	1322	South			
3	1323	East			
4	1321	West			
5					
6					

Comments:

*April 2012: updated using new Individual VP Module (V. 6.0).
CRAM score based on old VP module V. 5.0.3 = 70.5
New CRAM score = 76.4

Scoring Sheet: Individual Vernal Pools

AA Name: V65					**(m/d/y)**	09/29/2011
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			A	12	Avg=24.5%	
	Alpha.	Numeric				
(B): Percent of AA with Buffer	A	12			100% with buffer	
(C): Average Buffer Width	A	12			Avg=211m	
(D): Buffer Condition	B	9				
Initial Attribute Score = A + [D x (B x C)^{½}] ^{½}				22.4	Final Attribute Score = (Initial Score/24) x 100	93.3
Hydrology						
Water Source			A	12		
Hydroperiod			A	12		
Hydrologic Connectivity			B	9		
Initial Attribute Score			33		Final Attribute Score = (Initial Score/36) x 100	91.7
Physical Structure						
Structural Patch Richness			C	6	3 patch types	
Topographic Complexity			C	6		
Initial Attribute Score			12		Final Attribute Score = (Initial Score/24) x 100	50
Biotic Structure						
Horizontal Interspersion and Zonation			B	9		
	Alpha.	Numeric				
Community composition submetric A: Number of Co-dominants	B	9			5 co-dominant spp.	
Community composition submetric B: Percent Non-native	A	12			0% non-native spp.	
Community Composition submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Composition Metric (*numeric average of submetrics A-C*)				8		
Initial Attribute Score			17		Final Attribute Score = (Initial Score/24) x 100	70.8
Overall AA Score (Average of Final Attribute Scores)					**76.4**	

Worksheet 8: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	**Present**	**Present and likely to have significant negative effect on AA**
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	**Present**	**Present and likely to have significant negative effect on AA**
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**	X	
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information: Individual Vernal Pool

CRAM Site ID: APN: 333-130-004

Project Site ID: Fresno to Bakersfield HST

Assessment Area Name: V70

Project Name: Fresno to Bakersfield HST	**Date (m/d/y)**	9	21	11

Assessment Team Members for This AA

C. Julian	A. Langston
J. Love	C. Roberts
(Z. Simmons-USACE)	

Wetland Category:

X Natural □ Constructed □ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

□ entire wetland □ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

□ ponded/inundated □ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

□ long-duration □ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

□ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1201	North			
2	1203	South			
3	1202	East			
4	1204	West			
5					
6					

Comments:

*April 2012: updated using new Individual VP Module (V. 6.0).
CRAM score based on old VP module V. 5.0.3 = 55.7
New CRAM score = 56.7

Scoring Sheet: Individual Vernal Pools

AA Name: V70					**(m/d/y)**	09/21/2011
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			D	3	Avg=0%	
	Alpha.	Numeric				
(B): Percent of AA with Buffer	A	12			100% with buffer	
(C): Average Buffer Width	A	12			Avg=195m	
(D): Buffer Condition	B	9				
Initial Attribute Score = A + [D x (B x C)^{½}] ^{½}				13.4	Final Attribute Score = (Initial Score/24) x 100	55.8
Hydrology						
Water Source			A	12		
Hydroperiod			B	9		
Hydrologic Connectivity			C	6		
Initial Attribute Score			27		Final Attribute Score = (Initial Score/36) x 100	75
Physical Structure						
Structural Patch Richness			D	3	2 patch types	
Topographic Complexity			C	6		
Initial Attribute Score			9		Final Attribute Score = (Initial Score/24) x 100	37.5
Biotic Structure						
Horizontal Interspersion and Zonation			B	9		
Community composition submetric A: Number of Co-dominants	Alpha. B	Numeric 9			4 co-dominant spp.	
Community composition submetric B: Percent Non-native	D	3			75% non-native spp.	
Community Composition submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Composition Metric (*numeric average of submetrics A-C*)				5		
Initial Attribute Score			14		Final Attribute Score = (Initial Score/24) x 100	58.3
Overall AA Score (Average of Final Attribute Scores)					**56.7**	

Worksheet 8: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**	X	
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information: Individual Vernal Pool

CRAM Site ID: APN: 333-130-004

Project Site ID: Fresno to Bakersfield HST

Assessment Area Name: V72

Project Name: Fresno to Bakersfield HST	**Date (m/d/y)**	9	21	11

Assessment Team Members for This AA

C. Julian	A. Langston
J. Love	C. Roberts
(Z. Simmons-USACE)	

Wetland Category:

X Natural □ Constructed □ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

□ entire wetland □ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

□ ponded/inundated □ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

□ long-duration □ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

□ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1197	North			
2	1199	South			
3	1198	East			
4	1200	West			
5					
6					

Comments:

*April 2012: updated using new Individual VP Module (V. 6.0).
CRAM score based on old VP module V. 5.0.3 = 66.0
New CRAM score = 66.0

Scoring Sheet: Individual Vernal Pools

AA Name: V72					**(m/d/y)**	09/21/2011
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			D	3	Avg=3%	
	Alpha.	Numeric				
(B): Percent of AA with Buffer	A	12			100% with buffer	
(C): Average Buffer Width	A	12			Avg=190m	
(D): Buffer Condition	B	9				
Initial Attribute Score = A + [D x (B x C)^{½}] ^{½}				13.4	Final Attribute Score = (Initial Score/24) x 100	55.8
Hydrology						
Water Source			A	12		
Hydroperiod			B	9		
Hydrologic Connectivity			B	9		
Initial Attribute Score				30	Final Attribute Score = (Initial Score/36) x 100	83.3
Physical Structure						
Structural Patch Richness			D	3	2 patch types	
Topographic Complexity			B	9		
Initial Attribute Score				12	Final Attribute Score = (Initial Score/24) x 100	50
Biotic Structure						
Horizontal Interspersion and Zonation			A	12		
Community composition submetric A: Number of Co-dominants	Alpha. A	Numeric 12			6 co-dominant spp.	
Community composition submetric B: Percent Non-native	D	3			50% non-native spp.	
Community Composition submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Composition Metric (*numeric average of submetrics A-C*)				6		
Initial Attribute Score				18	Final Attribute Score = (Initial Score/24) x 100	75
Overall AA Score (Average of Final Attribute Scores)					**66.0**	

Worksheet 8: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)	X	
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
Road berm/levees are the source for both stressors.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**	X	
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse	X	X
Comments		
Trash scattered in wetland and dense dump across levee.		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming	X	
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
Suggestion of farming in last decade; not recent.		

Basic Information: Individual Vernal Pool

CRAM Site ID: APN: 333-130-006

Project Site ID: Fresno to Bakersfield HST

Assessment Area Name: V74

Project Name: Fresno to Bakersfield HST	**Date (m/d/y)**	9	20	11

Assessment Team Members for This AA

C. Julian	A. Langston
J. Love	C. Roberts

Wetland Category:

X Natural ☐ Constructed ☐ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

☐ entire wetland ☐ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

☐ ponded/inundated ☐ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

☐ long-duration ☐ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

☐ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	**Description**	**Latitude**	**Longitude**	**Datum**
1	1179	North			
2	1181	South			
3	1180	East			
4	1182	West			
5					
6					

Comments:

*April 2012: updated using new Individual VP Module (V. 6.0).
CRAM score based on old VP module V. 5.0.3 = 69.3
New CRAM score = 72.3

Scoring Sheet: Individual Vernal Pools

AA Name: V74					**(m/d/y)**	09/20/2011
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			D	3	Avg=1%	
	Alpha.	Numeric				
(B): Percent of AA with Buffer	A	12			100% with buffer	
(C): Average Buffer Width	A	12			Avg=250m	
(D): Buffer Condition	B	9				
Initial Attribute Score = A + [D x (B x C)^{½}] ^{½}				13.4	Final Attribute Score = (Initial Score/24) x 100	55.8
Hydrology						
Water Source			A	12		
Hydroperiod			B	9		
Hydrologic Connectivity			B	9		
Initial Attribute Score			30		Final Attribute Score = (Initial Score/36) x 100	83.3
Physical Structure						
Structural Patch Richness			C	6	3 patch types	
Topographic Complexity			A	12		
Initial Attribute Score			18		Final Attribute Score = (Initial Score/24) x 100	75
Biotic Structure						
Horizontal Interspersion and Zonation			A	12		
	Alpha.	Numeric				
Community composition submetric A: Number of Co-dominants	C	6			3 co-dominant spp.	
Community composition submetric B: Percent Non-native	B	9			33% non-native spp.	
Community Composition submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Composition Metric (*numeric average of submetrics A-C*)				6		
Initial Attribute Score			18		Final Attribute Score = (Initial Score/24) x 100	75
Overall AA Score (Average of Final Attribute Scores)					**72.3**	

Worksheet 8: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)	X	
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**	X	
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse	X	
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)	X	
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		
Hordeum is abundant.		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming	X	
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information: Individual Vernal Pool

CRAM Site ID: APN: 333-130-006

Project Site ID: Fresno to Bakersfield HST

Assessment Area Name: V75

Project Name: Fresno to Bakersfield HST	**Date (m/d/y)**	9	20	11

Assessment Team Members for This AA

C. Julian	A. Langston
J. Love	C. Roberts

Wetland Category:

X Natural □ Constructed □ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

□ entire wetland □ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

□ ponded/inundated □ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

□ long-duration □ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

□ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1183	North			
2	1185	South			
3	1184	East			
4	1186	West			
5					
6					

Comments:

*April 2012: updated using new Individual VP Module (V. 6.0).
CRAM score based on old VP module V. 5.0.3 = 66.1
New CRAM score = 66.0

Scoring Sheet: Individual Vernal Pools

AA Name: V75					**(m/d/y)**	09/20/2011
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			D	3	Avg=1.8%	
	Alpha.	Numeric				
(B): Percent of AA with Buffer	A	12			100% with buffer	
(C): Average Buffer Width	A	12			Avg=250m	
(D): Buffer Condition	B	9				
Initial Attribute Score = A + [D x (B x C)^{½}] ^{½}				13.4	Final Attribute Score = (Initial Score/24) x 100	55.8
Hydrology						
Water Source			A	12		
Hydroperiod			B	9		
Hydrologic Connectivity			B	9		
Initial Attribute Score			30		Final Attribute Score = (Initial Score/36) x 100	83.3
Physical Structure						
Structural Patch Richness			C	6	3 patch types	
Topographic Complexity			B	9		
Initial Attribute Score			15		Final Attribute Score = (Initial Score/24) x 100	62.5
Biotic Structure						
Horizontal Interspersion and Zonation			B	9		
Community composition submetric A: Number of Co-dominants	C	6			3 co-dominant spp.	
Community composition submetric B: Percent Non-native	B	9			33% non-native spp.	
Community Composition submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Composition Metric (*numeric average of submetrics A-C*)				6		
Initial Attribute Score			15		Final Attribute Score = (Initial Score/24) x 100	62.5
Overall AA Score (Average of Final Attribute Scores)					**66.0**	

Worksheet 8: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)	X	
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**	X	
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse	X	
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming	X	
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information: Individual Vernal Pool

CRAM Site ID: APN: 333-120-001

Project Site ID: Fresno to Bakersfield HST

Assessment Area Name: V76A

Project Name: Fresno to Bakersfield HST | **Date (m/d/y)** 9 | 19 | 11

Assessment Team Members for This AA

C. Julian	A. Langston
J. Love	C. Roberts
J. Whitfield	

Wetland Category:

X Natural □ Constructed □ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

□ entire wetland □ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

□ ponded/inundated □ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

□ long-duration X medium-duration □ short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

□ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1171	North			
2	1173	South			
3	1172	East			
4	1174	West			
5					
6					

Comments:

*April 2012: updated using new Individual VP Module (V. 6.0).
CRAM score based on old VP module V. 5.0.3 = 57.8
New CRAM score = 62.1

Scoring Sheet: Individual Vernal Pools

AA Name: V76A					**(m/d/y)**	09/19/2011
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			B	9	Avg=20.8%	
	Alpha.	Numeric				
(B): Percent of AA with Buffer	A	12			100% with buffer	
(C): Average Buffer Width	A	12			Avg=250m	
(D): Buffer Condition	C	6				
Initial Attribute Score = A + [D x (B x C)^{½}] ^{½}				14.6	Final Attribute Score = (Initial Score/24) x 100	60.9
Hydrology						
Water Source			A	12		
Hydroperiod			B	9		
Hydrologic Connectivity			B	9		
Initial Attribute Score			30		Final Attribute Score = (Initial Score/36) x 100	83.3
Physical Structure						
Structural Patch Richness			C	6	3 patch types	
Topographic Complexity			C	6		
Initial Attribute Score			12		Final Attribute Score = (Initial Score/24) x 100	50
Biotic Structure						
Horizontal Interspersion and Zonation			B	9		
Community composition submetric	Alpha.	Numeric				
A: Number of Co-dominants	C	6			2 co-dominant spp.	
Community composition submetric B: Percent Non-native	D	3			100% non-native spp.	
Community Composition submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Composition Metric (*numeric average of submetrics A-C*)				4		
Initial Attribute Score			13		Final Attribute Score = (Initial Score/24) x 100	54.2
Overall AA Score (Average of Final Attribute Scores)					**62.1**	

Worksheet 8: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)	X	
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
Berm to east; road grade to south; not a significant effect.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer	X	
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming	X	
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information: Individual Vernal Pool

CRAM Site ID: APN: 333-120-001

Project Site ID: Fresno to Bakersfield HST

Assessment Area Name: V76D

Project Name: Fresno to Bakersfield HST | **Date (m/d/y)** 9 | 19 | 11

Assessment Team Members for This AA

C. Julian	A. Langston
J. Love	C. Roberts
J. Whitfield	

Wetland Category:
X Natural □ Constructed □ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:
□ entire wetland □ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?
□ ponded/inundated □ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?
□ long-duration □ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?
□ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1175	North			
2	1177	South			
3	1176	East			
4	1178	West			
5					
6					

Comments:
*April 2012: updated using new Individual VP Module (V. 6.0).
CRAM score based on old VP module V. 5.0.3 = 50.5
New CRAM score = 59.8

Scoring Sheet: Individual Vernal Pools

AA Name: V76D					(m/d/y)	09/19/2011
Attributes and Metrics			Alpha.	Numeric	**Comments**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			B	9	Avg=16%	
	Alpha.	Numeric				
(B): Percent of AA with Buffer	A	12			100% with buffer	
(C): Average Buffer Width	A	12			Avg=250m	
(D): Buffer Condition	B	9				
Initial Attribute Score = A + [D x (B x C)^{½}] ^{½}				19.4	Final Attribute Score = (Initial Score/24) x 100	80.8
Hydrology						
Water Source			A	12		
Hydroperiod			B	9		
Hydrologic Connectivity			B	9		
Initial Attribute Score				30	Final Attribute Score = (Initial Score/36) x 100	83.3
Physical Structure						
Structural Patch Richness			C	6	3 patch types	
Topographic Complexity			C	6		
Initial Attribute Score				12	Final Attribute Score = (Initial Score/24) x 100	50
Biotic Structure						
Horizontal Interspersion and Zonation			D	3		
Community composition submetric A: Number of Co-dominants	Alpha. D	Numeric 3			1 co-dominant sp.	
Community composition submetric B: Percent Non-native	D	3			100% non-native spp.	
Community Composition submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Composition Metric (*numeric average of submetrics A-C*)				3		
Initial Attribute Score				6	Final Attribute Score = (Initial Score/24) x 100	25
Overall AA Score (Average of Final Attribute Scores)					**59.8**	

Worksheet 8: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)	X	
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
Road berm.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming	X	
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information: Individual Vernal Pool

CRAM Site ID: APN: 333-020-005

Project Site ID: Fresno to Bakersfield HST

Assessment Area Name: V104

Project Name: Fresno to Bakersfield HST	**Date (m/d/y)**	9	27	11

Assessment Team Members for This AA

A. Langston

G. Peracca

C. Roberts

Wetland Category:

X Natural □ Constructed □ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

□ entire wetland □ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

□ ponded/inundated □ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

□ long-duration □ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

□ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1278	North			
2	1280	South			
3	1179	East			
4	1181	West			
5					
6					

Comments:

*April 2012: updated using new Individual VP Module (V. 6.0).
CRAM score based on old VP module V. 5.0.3 = 74.5
New CRAM score = 77.5

Scoring Sheet: Individual Vernal Pools

AA Name: V104					**(m/d/y)**	09/27/2011
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			A	12	Avg=32.3%	
	Alpha.	Numeric				
(B): Percent of AA with Buffer	A	12			100% with buffer	
(C): Average Buffer Width	A	12			Avg=199.4m	
(D): Buffer Condition	B	9				
Initial Attribute Score = A + [D x (B x C)^{½}] ^{½}				22.4	Final Attribute Score = (Initial Score/24) x 100	93.3
Hydrology						
Water Source			A	12		
Hydroperiod			A	12		
Hydrologic Connectivity			A	12		
Initial Attribute Score				36	Final Attribute Score = (Initial Score/36) x 100	100
Physical Structure						
Structural Patch Richness			D	3	2 patch types	
Topographic Complexity			B	9		
Initial Attribute Score				12	Final Attribute Score = (Initial Score/24) x 100	50
Biotic Structure						
Horizontal Interspersion and Zonation			B	9		
	Alpha.	Numeric				
Community composition submetric A: Number of Co-dominants	C	6			3 co-dominant spp.	
Community composition submetric B: Percent Non-native	A	12			0% non-native spp.	
Community Composition submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Composition Metric (*numeric average of submetrics A-C*)				7		
Initial Attribute Score				16	Final Attribute Score = (Initial Score/24) x 100	66.7
Overall AA Score (Average of Final Attribute Scores)					**77.5**	

Worksheet 8: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
Hwy 43 "levee" within 50m but does not negatively impact AA hydrology.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
Within 500 m of orchard and HWY 43 and BNSF RR.		

Basic Information: Individual Vernal Pool

CRAM Site ID: APN: 333-030-006
Project Site ID: Fresno to Bakersfield HST
Assessment Area Name: V114
Project Name: Fresno to Bakersfield HST | **Date (m/d/y)** 9 | 22 | 11

Assessment Team Members for This AA

J. Love	C. Julian
A. Langston	C. Roberts

Wetland Category:
X Natural ☐ Constructed ☐ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:
☐ entire wetland ☐ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?
☐ ponded/inundated ☐ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

☐ long-duration ☐ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?
☐ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1220	North			
2	1222	South			
3	1121	East			
4	1123	West			
5					
6					

Comments:
*April 2012: updated using new Individual VP Module (V. 6.0).
CRAM score based on old VP module V. 5.0.3 = 76.5
New CRAM score = 79.9

Scoring Sheet: Individual Vernal Pools

AA Name: V114					(m/d/y)	09/22/2011
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			A	12	Avg=28.8%	
	Alpha.	Numeric				
(B): Percent of AA with Buffer	A	12			100% with buffer	
(C): Average Buffer Width	B	9			Avg=143.1m	
(D): Buffer Condition	B	9				
Initial Attribute Score = A + [D x (B x C)^{½}] ^{½}				21.7	Final Attribute Score = (Initial Score/24) x 100	90.3
Hydrology						
Water Source			A	12		
Hydroperiod			B	9		
Hydrologic Connectivity			B	9		
Initial Attribute Score				30	Final Attribute Score = (Initial Score/36) x 100	83.3
Physical Structure						
Structural Patch Richness			D	3	2 patch types	
Topographic Complexity			A	12		
Initial Attribute Score				15	Final Attribute Score = (Initial Score/24) x 100	62.5
Biotic Structure						
Horizontal Interspersion and Zonation			A	12		
Community composition submetric A: Number of Co-dominants	Alpha. B	Numeric 9			5 co-dominant spp.	
Community composition submetric B: Percent Non-native	A	12			0% non-native spp.	
Community Composition submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Composition Metric (*numeric average of submetrics A-C*)				8		
Initial Attribute Score				20	Final Attribute Score = (Initial Score/24) x 100	83.3
Overall AA Score (Average of Final Attribute Scores)					**79.9**	

Worksheet 8: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
Road berm for SR43.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**	X	
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
Road berm for SR43.		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
SR43 and BNSF corridor (less than 5 meters west of AA)		

Basic Information: Individual Vernal Pool

CRAM Site ID: APN: 333-030-006

Project Site ID: Fresno to Bakersfield HST

Assessment Area Name: V115A

Project Name: Fresno to Bakersfield HST	**Date (m/d/y)**	9	27	11

Assessment Team Members for This AA

G. Peracca

A. Langston

C. Roberts

Wetland Category:

X Natural ☐ Constructed ☐ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

☐ entire wetland ☐ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

☐ ponded/inundated ☐ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

☐ long-duration ☐ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

☐ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1254	North	35.80273	-119.35871	
2	1257	outh			
3	1155	East			
4	1156	West			
5					
6					

Comments:

*April 2012: updated using new Individual VP Module (V. 6.0).
CRAM score based on old VP module V. 5.0.3 = 80.0
New CRAM score = 80.9

Scoring Sheet: Individual Vernal Pools

AA Name: V115A					**(m/d/y)**	09/27/2011
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			A	12	Avg=51%	
	Alpha.	Numeric				
(B): Percent of AA with Buffer	A	12			100% with buffer	
(C): Average Buffer Width	B	9			Avg=186.9m	
(D): Buffer Condition	B	9				
Initial Attribute Score $= A + [D \times (B \times C)^{½}]^{½}$				21.7	Final Attribute Score = (Initial Score/24) x 100	90.3
Hydrology						
Water Source			A	12		
Hydroperiod			A	12		
Hydrologic Connectivity			A	12		
Initial Attribute Score				36	Final Attribute Score = (Initial Score/36) x 100	100
Physical Structure						
Structural Patch Richness			D	3	2 patch types	
Topographic Complexity			A	12		
Initial Attribute Score				15	Final Attribute Score = (Initial Score/24) x 100	62.5
Biotic Structure						
Horizontal Interspersion and Zonation			B	9		
Community composition submetric A: Number of Co-dominants	Alpha. B	Numeric 9			5 co-dominant spp.	
Community composition submetric B: Percent Non-native	A	12			20% non-native spp.	
Community Composition submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Composition Metric (*numeric average of submetrics A-C*)				8		
Initial Attribute Score				17	Final Attribute Score = (Initial Score/24) x 100	70.8
Overall AA Score (Average of Final Attribute Scores)					**80.9**	

Worksheet 8: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
SR43 is about 50 meters away.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
SR43 and BNSF corridor about 50 meters away.		

Basic Information: Vernal Pool Systems

CRAM Site ID: APN: 333-020-005

Project Site ID: Fresno to Bakersfield HST

Assessment Area Name: VS97A

Project Name: Fresno to Bakersfield HST	**Date (m/d/y)**	9	26	11

Assessment Team Members for This AA

J. Whitfield	G. Peracca
C. Roberts	A. Langston

Wetland Category:

X Natural □ Constructed □ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

□ entire wetland □ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

□ ponded/inundated □ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

□ long-duration □ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

□ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1232	North			
2	1234	South			
3	1233	East			
4	1235	West			
5					
6					

Comments:

*April 2012: updated using new Individual VP Module (V. 6.0).

CRAM score based on old VP module V. 5.0.3 = 68.5

New CRAM score = 76.7

Scoring Sheet: Vernal Pool Systems

AA Name: VS97A					**(m/d/y)**	09/26/2011
Attributes and Metrics			Alpha.	Numeric	**Comments/Scores**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			B	9	Avg=15%	
(B): Percent of AA with Buffer	Alpha.	Numeric				
	A	12			100% with buffer	
(C): Average Buffer Width	B	9			Avg=151.9m	
(D): Buffer Condition	B	9				
Initial Attribute Score = A + [D x (B x C)^{½}] ^{½}				18.7	Final Attribute Score = (Initial Score/24) x 100	77.8
Hydrology						
Water Source			A	12		
Hydroperiod			B	9		
Hydrologic Connectivity			B	9		
Initial Attribute Score			30		Final Attribute Score = (Initial Score/36) x 100	83.3
Physical Structure						
Structural Patch Richness			B	9	8 patch types	
Pool and Swale Density			A	12	Avg=60%	
Topographic Complexity			C	6		
Initial Attribute Score			27		Final Attribute Score = (Initial Score/36) x 100	75
Biotic Structure						
	Alpha.	Numeric				
Plant Community submetric A: Number of Co-dominant species	B	9			4 co-dominant spp.	
Plant Community submetric B: Percent Non Native	A	12			14.3% non-native spp.	
Plant Community submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Metric (*average of submetrics A-C*)				8		
Horizontal Interspersion and Zonation			B	9		
Initial Attribute Score			17		Final Attribute Score = (Initial Score/24) x 100	70.8
Overall AA Score (Average of Final Attribute Scores)					**76.7**	

Worksheet 9: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
Railroad berm.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**	X	
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	X
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
BNSF railroad corridor.		

Basic Information: Vernal Pool Systems

CRAM Site ID: APN: 333-020-005				
Project Site ID: Fresno to Bakersfield HST				
Assessment Area Name: VS99A				
Project Name: Fresno to Bakersfield HST	**Date (m/d/y)**	9	26	11

Assessment Team Members for This AA

J. Whitfield	G. Peracca
C. Roberts	A. Langston

Wetland Category:

X Natural ☐ Constructed ☐ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

☐ entire wetland ☐ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

☐ ponded/inundated ☐ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

☐ long-duration ☐ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

☐ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1236	North	35.00945	-119.36341	
2	1238	outh			
3	1237	East			
4	1239	West			
5					
6					

Comments:

*April 2012: updated using new Individual VP Module (V. 6.0).

CRAM score based on old VP module V. 5.0.3 = 77.5

New CRAM score = 82.7

Scoring Sheet: Vernal Pool Systems

AA Name: VS99A				**(m/d/y)**	09/26/2011
Attributes and Metrics		Alpha.	Numeric	**Comments/Scores**	
Buffer and Landscape Context					
(A) Aquatic Area Connectivity		A	12	Avg=33.8%	
(B): Percent of AA with Buffer	Alpha. A / Numeric 12			100% with buffer	
(C): Average Buffer Width	Alpha. A / Numeric 12			Avg=191.9m	
(D): Buffer Condition	Alpha. B / Numeric 9				
Initial Attribute Score $= A + [D \times (B \times C)^{1/2}]^{1/2}$			22.4	Final Attribute Score = (Initial Score/24) x 100	93.3
Hydrology					
Water Source		A	12		
Hydroperiod		A	12		
Hydrologic Connectivity		B	9		
Initial Attribute Score		33		Final Attribute Score = (Initial Score/36) x 100	91.7
Physical Structure					
Structural Patch Richness		B	9	9 patch types	
Pool and Swale Density		A	12	Avg=58.8%	
Topographic Complexity		C	6		
Initial Attribute Score		27		Final Attribute Score = (Initial Score/36) x 100	75
Biotic Structure					
Plant Community submetric A: Number of Co-dominant species	Alpha. B / Numeric 9			5 co-dominant spp.	
Plant Community submetric B: Percent Non Native	Alpha. A / Numeric 12			14.3% non-native spp.	
Plant Community submetric C: Endemic Species Richness	Alpha. D / Numeric 3			0 endemic spp.	
Plant Community Metric (*average of submetrics A-C*)			8		
Horizontal Interspersion and Zonation		B	9		
Initial Attribute Score		17		Final Attribute Score = (Initial Score/24) x 100	70.8
Overall AA Score (Average of Final Attribute Scores)				**82.7**	

Worksheet 9: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
Dike levee 60 meters away.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information: Vernal Pool Systems

CRAM Site ID: APN: 333-020-005				
Project Site ID: Fresno to Bakersfield HST				
Assessment Area Name: VS104A				
Project Name: Fresno to Bakersfield HST	**Date (m/d/y)**	9	27	11

Assessment Team Members for This AA

A. Langston G. Peracca

C. Roberts

Wetland Category:

X Natural ◻ Constructed ◻ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

◻ entire wetland ◻ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

◻ ponded/inundated ◻ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

◻ long-duration ◻ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

◻ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1260	North	35.80731	-119.36221	
2	1262, 63	South			
3	1261	East			
4	1264	West			
5					
6					

Comments:

*April 2012: updated using new Individual VP Module (V. 6.0).

CRAM score based on old VP module V. 5.0.3 = 67.5

New CRAM score = 77.8

Scoring Sheet: Vernal Pool Systems

AA Name: VS104A					**(m/d/y)**	09/27/2011
Attributes and Metrics			Alpha.	Numeric	**Comments/Scores**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			B	9	Avg=15%	
(B): Percent of AA with Buffer	Alpha.	Numeric				
	A	12			100% with buffer	
(C): Average Buffer Width	B	9			Avg=186.9m	
(D): Buffer Condition	B	9				
Initial Attribute Score = A + [D x (B x C)^{½}] ^{½}				18.7	Final Attribute Score = (Initial Score/24) x 100	77.8
Hydrology						
Water Source			A	12		
Hydroperiod			A	12		
Hydrologic Connectivity			A	12		
Initial Attribute Score			36		Final Attribute Score = (Initial Score/36) x 100	100
Physical Structure						
Structural Patch Richness			B	9	9 patch types	
Pool and Swale Density			A	12	Avg=46.3%	
Topographic Complexity			C	6		
Initial Attribute Score			27		Final Attribute Score = (Initial Score/36) x 100	75
Biotic Structure						
	Alpha.	Numeric				
Plant Community submetric A: Number of Co-dominant species	C	6			3 co-dominant spp.	
Plant Community submetric B: Percent Non Native	C	6			42.9% non-native spp.	
Plant Community submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Metric (*average of submetrics A-C*)				5		
Horizontal Interspersion and Zonation			B	9		
Initial Attribute Score			14		Final Attribute Score = (Initial Score/24) x 100	58.3
Overall AA Score (Average of Final Attribute Scores)					**77.8**	

Worksheet 9: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
SR43 is within 50 meters of AA but does not provide much influence on AA hydrology.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
AA within 500 meters of orchard (to the west)		
AA within 500 meters of SR43/BNSF RR		

Basic Information: Vernal Pool Systems

CRAM Site ID: APN: 333-020-005

Project Site ID: Fresno to Bakersfield HST

Assessment Area Name: VS107A

Project Name: Fresno to Bakersfield HST | **Date (m/d/y)** 9 22 11

Assessment Team Members for This AA

A. Langston J. Love

C. Roberts C. Julian

Wetland Category:

X Natural ☐ Constructed ☐ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

☐ entire wetland ☐ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

☐ ponded/inundated ☐ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

☐ long-duration ☐ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

☐ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1224	North	35.80561	-119.36192	
2	1226	South			
3	1225	East			
4	1227	West			
5					
6					

Comments:

*April 2012: updated using new Individual VP Module (V. 6.0).

CRAM score based on old VP module V. 5.0.3 = 74.5

New CRAM score = 80.6

Scoring Sheet: Vernal Pool Systems

AA Name: VS107A					**(m/d/y)**	09/22/2011
Attributes and Metrics			Alpha.	Numeric	**Comments/Scores**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			B	9	Avg=13.8%	
(B): Percent of AA with Buffer	Alpha.	Numeric				
	A	12			100% with buffer	
(C): Average Buffer Width	A	12			Avg=200.8m	
(D): Buffer Condition	B	9				
Initial Attribute Score = A + [D x (B x C)$^{1/2}$] $^{1/2}$				19.4	Final Attribute Score = (Initial Score/24) x 100	80.8
Hydrology						
Water Source			A	12		
Hydroperiod			A	12		
Hydrologic Connectivity			A	12		
Initial Attribute Score			36		Final Attribute Score = (Initial Score/36) x 100	100
Physical Structure						
Structural Patch Richness			B	9	10 patch types	
Pool and Swale Density			B	9	Avg=30%	
Topographic Complexity			B	9		
Initial Attribute Score			27		Final Attribute Score = (Initial Score/36) x 100	75
Biotic Structure						
	Alpha.	Numeric				
Plant Community submetric A: Number of Co-dominant species	B	9			4 co-dominant spp.	
Plant Community submetric B: Percent Non Native	B	9			25% non-native spp.	
Plant Community submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Metric (*average of submetrics A-C*)				7		
Horizontal Interspersion and Zonation			B	9		
Initial Attribute Score			16		Final Attribute Score = (Initial Score/24) x 100	66.7
Overall AA Score (Average of Final Attribute Scores)					**80.6**	

Worksheet 9: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
Orchard approximately 450 meters to the east.		

Basic Information: Vernal Pool Systems

CRAM Site ID: APN: 333-030-006

Project Site ID: Fresno to Bakersfield HST

Assessment Area Name: VS112

Project Name: Fresno to Bakersfield HST	**Date (m/d/y)**	9	22	11

Assessment Team Members for This AA

A. Langston	J. Love
C. Roberts	C. Julian

Wetland Category:

X Natural ◻ Constructed ◻ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

◻ entire wetland ◻ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

◻ ponded/inundated ◻ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

◻ long-duration ◻ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

◻ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1209, 16	North			
2	1211, 18	South			
3	1210, 17	East			
4	1212, 19	West			
5					
6					

Comments:

*April 2012: updated using new Individual VP Module (V. 6.0).

CRAM score based on old VP module V. 5.0.3 = 71.5

New CRAM score = 76.7

Scoring Sheet: Vernal Pool Systems

AA Name: VS112				**(m/d/y)**	09/22/2011
Attributes and Metrics		Alpha.	Numeric	**Comments/Scores**	
Buffer and Landscape Context					
(A) Aquatic Area Connectivity		B	9	Avg=14.8%	
(B): Percent of AA with Buffer	Alpha. A / Numeric 12			98% with buffer	
(C): Average Buffer Width	B / 9			Avg=145m	
(D): Buffer Condition	B / 9				
Initial Attribute Score = A + [D x (B x C)$^{1/2}$] $^{1/2}$			18.7	Final Attribute Score = (Initial Score/24) x 100	77.8
Hydrology					
Water Source		B	9		
Hydroperiod		B	9		
Hydrologic Connectivity		B	9		
Initial Attribute Score			27	Final Attribute Score = (Initial Score/36) x 100	75
Physical Structure					
Structural Patch Richness		B	9	9 patch types	
Pool and Swale Density		A	12	Avg=56.3%	
Topographic Complexity		B	9		
Initial Attribute Score			30	Final Attribute Score = (Initial Score/36) x 100	83.3
Biotic Structure					
Plant Community submetric A: Number of Co-dominant species	Alpha. B / Numeric 9			4 co-dominant spp.	
Plant Community submetric B: Percent Non Native	A / 12			9% non-native spp.	
Plant Community submetric C: Endemic Species Richness	D / 3			0 endemic spp.	
Plant Community Metric (*average of submetrics A-C*)			8		
Horizontal Interspersion and Zonation		B	9		
Initial Attribute Score			17	Final Attribute Score = (Initial Score/24) x 100	70.8
Overall AA Score (Average of Final Attribute Scores)				**76.7**	

Worksheet 9: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
Road berm for SR43.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**	X	
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
Road berm for SR43.		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
SR43 and BNSF corridor are less than 50 meters west of AA.		

Basic Information: Vernal Pool Systems

CRAM Site ID: APN: 333-030-006

Project Site ID: Fresno to Bakersfield HST

Assessment Area Name: VS114A

Project Name: Fresno to Bakersfield HST | **Date (m/d/y)** 9 27 11

Assessment Team Members for This AA

A. Langston G. Peracca

C. Roberts

Wetland Category:

X Natural □ Constructed □ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

□ entire wetland □ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

□ ponded/inundated □ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

□ long-duration □ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

□ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1248	North			
2	1250	South			
3	1249	East			
4	1251	West			
5					
6					

Comments:

*April 2012: updated using new Individual VP Module (V. 6.0).

CRAM score based on old VP module V. 5.0.3 = 74.7

New CRAM score = 80.9

Scoring Sheet: Vernal Pool Systems

AA Name: VS114A					**(m/d/y)**	09/27/2011
Attributes and Metrics			Alpha.	Numeric	**Comments/Scores**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			A	12	Avg=34.8%	
(B): Percent of AA with Buffer	Alpha.	Numeric				
	A	12			100% with buffer	
(C): Average Buffer Width	B	9			Avg=184.4m	
(D): Buffer Condition	B	9				
Initial Attribute Score $= A + [D \times (B \times C)^{1/2}]^{1/2}$				21.7	Final Attribute Score = (Initial Score/24) x 100	90.3
Hydrology						
Water Source			A	12		
Hydroperiod			A	12		
Hydrologic Connectivity			A	12		
Initial Attribute Score			36		Final Attribute Score = (Initial Score/36) x 100	100
Physical Structure						
Structural Patch Richness			B	9	9 patch types	
Pool and Swale Density			B	9	Avg=30%	
Topographic Complexity			C	6		
Initial Attribute Score			24		Final Attribute Score = (Initial Score/36) x 100	66.7
Biotic Structure						
	Alpha.	Numeric				
Plant Community submetric A: Number of Co-dominant species	B	9			4 co-dominant spp.	
Plant Community submetric B: Percent Non Native	B	9			25% non-native spp.	
Plant Community submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Metric (*average of submetrics A-C*)				7		
Horizontal Interspersion and Zonation			B	9		
Initial Attribute Score			16		Final Attribute Score = (Initial Score/24) x 100	66.7
Overall AA Score (Average of Final Attribute Scores)					**80.9**	

Worksheet 9: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
SR43 is approximately 80 meters away.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
SR43 and BNSF corridor are approximately 80 meters away.		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: A. Langston	
Assessment Area Name: D304	
Assessment No.	**Date (mm/dd/yyyy):** 05/16/2012

Assessment Team Members for This AA

G. Peracca

A.Langston

E. Maroni

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Which best describes the type of depressional wetland?

X freshwater marsh [ ] alkaline marsh [ ] alkali flat [ ] other (specify):

Which best describes the hydrologic state of the wetland at the time of assessment?

[ ] ponded/inundated [ ] saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

[ ] long-duration [ ] medium-duration X short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes X no

This wetland is located in a historic braided stream channel that no longer functions as a flow-throw system due to an impenetrable berm downstream. Water now appears to pond in these channels

Is the topographic basin of the wetland X distinct or [ ] indistinct ?

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	5660	North			
2	5658	South			
3	5661	East			
4	5659	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: D304				**Date:** 05/16/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		9		Avg=68.8%	
Buffer submetric A: Percent of AA with Buffer	12			100% with buffer	
Buffer submetric B: Average Buffer Width	12			Avg= 244 meters	
Buffer submetric C: Buffer Condition	9				
D + [C x (A x B)^{½}] ^{½} = **Attribute Score**		Raw	Final	Final Attribute Score = (Raw Score/24)100	80.8
		19.4	80.8		
Hydrology					
Water Source		9			
Hydroperiod or Channel Stability		9			
Hydrologic Connectivity		12			
Attribute Score83.3		Raw	Final	Final Attribute Score = (Raw Score/36)100	83.3
		30	83.3		
Physical Structure					
Structural Patch Richness		3		2 Patches	
Topographic Complexity		9			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	50
		12	50		
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	6			2 Layers	
Plant Community submetric B: Number of Co-dominant species	3			3 co-dominant spp.	
Plant Community submetric C: Percent Invasion	12			0% non-native spp.	
Plant Community Metric (*average of submetrics A-C*)		7			
Horizontal Interspersion and Zonation		6			
Vertical Biotic Structure		12			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	69.4
		25	69.4		
Overall AA Score (Average of Final Attribute Scores)				**70.9**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture	X	
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)	X	
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
Off-road vehicle tracks, shotgun shells, refuse set up for shooting practice all litter the property		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: A. Langston		
Assessment Area Name: Buena Vista Dairy D304		
Assessment No.		**Date (mm/dd/yyyy):** 05/16/2012

Assessment Team Members for This AA

G. Peracca

A.Langston

E. Maroni

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Which best describes the type of depressional wetland?

X freshwater marsh [ ] alkaline marsh [ ] alkali flat [ ] other (specify):

Which best describes the hydrologic state of the wetland at the time of assessment?

[ ] ponded/inundated [ ] saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

[ ] long-duration [ ] medium-duration X short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes X no

This wetland is located in a historic braided stream channel that no longer functions as a flow-throw system due to an impenetrable berm downstream. Water now appears to pond in these channels

Is the topographic basin of the wetland X distinct or [ ] indistinct ?

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	5660	North			
2	5658	South			
3	5661	East			
4	5659	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: Buena Vista Dairy D304				**Date:** 05/16/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		9		Avg=68.8%	
Buffer submetric A: Percent of AA with Buffer	12			100% with buffer	
Buffer submetric B: Average Buffer Width	12			Avg= 244 meters	
Buffer submetric C: Buffer Condition	9				
D + [C x (A x B)$^{1/2}$] $^{1/2}$ = **Attribute Score**		Raw 19.4	Final 80.8	Final Attribute Score = (Raw Score/24)100	80.8
Hydrology					
Water Source		9			
Hydroperiod or Channel Stability		9			
Hydrologic Connectivity		12			
Attribute Score83.3		Raw 30	Final 83.3	Final Attribute Score = (Raw Score/36)100	83.3
Physical Structure					
Structural Patch Richness		3		2 Patches	
Topographic Complexity		9			
Attribute Score		Raw 12	Final 50	Final Attribute Score = (Raw Score/24)100	50
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	6			2 Layers	
Plant Community submetric B: Number of Co-dominant species	3			3 co-dominant spp.	
Plant Community submetric C: Percent Invasion	12			0% non-native spp.	
Plant Community Metric (*average of submetrics A-C*)		7			
Horizontal Interspersion and Zonation		6			
Vertical Biotic Structure		12			
Attribute Score		Raw 25	Final 69.4	Final Attribute Score = (Raw Score/36)100	69.4
Overall AA Score (Average of Final Attribute Scores)				**70.9**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture	X	
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)	X	
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
Off-road vehicle tracks, shotgun shells, refuse set up for shooting practice all litter the property		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: A. Langston		
Assessment Area Name: Buena Vista Dairy D305		
Assessment No.		**Date (mm/dd/yyyy):** 05/16/2012

Assessment Team Members for This AA

G. Peracca

A.Langston

E. Maroni

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted **X** Other

Which best describes the type of depressional wetland?

X freshwater marsh [ ] alkaline marsh [ ] alkali flat [ ] other (specify):

Which best describes the hydrologic state of the wetland at the time of assessment?

[ ] ponded/inundated [ ] saturated soil, but no surface water **X** dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

[ ] long-duration [ ] medium-duration **X** short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes **X** no

Is the topographic basin of the wetland **X** distinct or [ ] indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1253	North			
2	1251	South			
3	1252	East			
4	1250	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: Buena Vista Dairy D305				**Date:** 05/16/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		12		Avg=87.5%	
Buffer submetric A: Percent of AA with Buffer	12			100% with buffer	
Buffer submetric B: Average Buffer Width	12			Avg= 250 meters	
Buffer submetric C: Buffer Condition	9				
$D + [C \times (A \times B)^{1/2}]^{1/2}$ **= Attribute Score**		Raw 22.4	Final 93.3	Final Attribute Score = (Raw Score/24)100	93.3
Hydrology					
Water Source		9			
Hydroperiod or Channel Stability		9			
Hydrologic Connectivity		12			
Attribute Score83.3		Raw 30	Final 83.3	Final Attribute Score = (Raw Score/36)100	83.3
Physical Structure					
Structural Patch Richness		3		3 patch types	
Topographic Complexity		9			
Attribute Score		Raw 12	Final 50	Final Attribute Score = (Raw Score/24)100	50
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	6			1 Layers	
Plant Community submetric B: Number of Co-dominant species	3			3 co-dominant spp.	
Plant Community submetric C: Percent Invasion	6			33% non-native spp.	
Plant Community Metric (*average of submetrics A-C*)		5			
Horizontal Interspersion and Zonation		6			
Vertical Biotic Structure		9			
Attribute Score		Raw 20	Final 55.6	Final Attribute Score = (Raw Score/36)100	55.6
Overall AA Score (Average of Final Attribute Scores)				**70.5**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture	X	
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)	X	
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
Off-road vehicle tracks, shotgun shells, refuse set up for shooting practice all litter the property		

Basic Information: Individual Vernal Pool

CRAM Site ID: Buena Vista Dairy

Project Site ID: Fresno to Bakersfield HST CMP

Assessment Area Name: V305

Project Name: Fresno to Bakersfield HST	**Date (m/d/y)**	5	16	12

Assessment Team Members for This AA

G. Peracca

A.Langston

E. Maroni

Wetland Category:

X Natural ☐ Constructed ☐ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

☐ entire wetland ☐ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

☐ ponded/inundated ☐ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

☐ long-duration ☐ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

☐ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1259	North			
2	1258	South			
3	1265	East			
4	1264	West			
5					
6					

Comments:

Scoring Sheet: Individual Vernal Pools

AA Name: V305					**(m/d/y)**	05/16/2012
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			A	12	Avg=68%	
	Alpha.	Numeric				
(B): Percent of AA with Buffer	A	12			100% with buffer	
(C): Average Buffer Width	A	12			Avg=236 meters	
(D): Buffer Condition	B	9				
Initial Attribute Score = A + [D x (B x C)^{½}] ^{½}				22.4	Final Attribute Score = (Initial Score/24) x 100	93.3
Hydrology						
Water Source			B	9		
Hydroperiod			A	12		
Hydrologic Connectivity			A	12		
Initial Attribute Score			33		Final Attribute Score = (Initial Score/36) x 100	91.7
Physical Structure						
Structural Patch Richness			C	6	4 patch types	
Topographic Complexity			B	9		
Initial Attribute Score			15		Final Attribute Score = (Initial Score/24) x 100	62.5
Biotic Structure						
Horizontal Interspersion and Zonation			C	6		
	Alpha.	Numeric				
Community composition submetric A: Number of Co-dominants	B	9			4 co-dominant spp.	
Community composition submetric B: Percent Non-native	B	9			25% non-native spp.	
Community Composition submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Composition Metric (*numeric average of submetrics A-C*)				7		
Initial Attribute Score			13		Final Attribute Score = (Initial Score/24) x 100	54.2
Overall AA Score (Average of Final Attribute Scores)					**75.4**	

Worksheet 8: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	X
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	X
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
Some evidence of active recreation on property but not w/in 500 meters		

Basic Information: Vernal Pool Systems

CRAM Site ID: APN: Buena Vista Dairy

Project Site ID: Fresno to Bakersfield CMP

Assessment Area Name: VS 305

Project Name: Fresno to Bakersfield HST	**Date (m/d/y)**	5	16	12

Assessment Team Members for This AA

E.Maroni

A. Langston

G. Peracca

Wetland Category:

X Natural ☐ Constructed ☐ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

☐ entire wetland ☐ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

☐ ponded/inundated ☐ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

☐ long-duration ☐ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

☐ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	**Description**	**Latitude**	**Longitude**	**Datum**
1	1260	North			
2	1261	South			
3	1262	East			
4	1263	West			
5					
6					

Comments:

Scoring Sheet: Vernal Pool Systems

AA Name: VS305			**(m/d/y)**	05/16/2012
Attributes and Metrics	Alpha.	Numeric	**Comments/Scores**	
Buffer and Landscape Context				
(A) Aquatic Area Connectivity	A	12	Avg=85%	
(B): Percent of AA with Buffer	A	12	100% with buffer	
(C): Average Buffer Width	A	12	Avg=250 meters	
(D): Buffer Condition	B	9		
Initial Attribute Score $= A + [D \times (B \times C)^{1/2}]^{1/2}$		22.4	Final Attribute Score = (Initial Score/24) x 100	93.3
Hydrology				
Water Source	A	12		
Hydroperiod	B	9		
Hydrologic Connectivity	A	12		
Initial Attribute Score	33		Final Attribute Score = (Initial Score/36) x 100	91.7
Physical Structure				
Structural Patch Richness	B	9	8 patch types	
Pool and Swale Density	A	12		
Topographic Complexity	C	6		
Initial Attribute Score	27		Final Attribute Score = (Initial Score/36) x 100	75
Biotic Structure				
Plant Community submetric A: Number of Co-dominant species	C	6	2.5 co-dominant spp.	
Plant Community submetric B: Percent Non Native	B	9	33% non-native spp.	
Plant Community submetric C: Endemic Species Richness	D	3	0 endemic spp.	
Plant Community Metric (*average of submetrics A-C*)		6		
Horizontal Interspersion and Zonation	B	9		
Initial Attribute Score	15		Final Attribute Score = (Initial Score/24) x 100	62.5
Overall AA Score (Average of Final Attribute Scores)			**80.6**	

Worksheet 9: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	X
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	X
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
Evidence of active recreation onsite but not within some of AA		

Basic Information: Vernal Pool Systems

CRAM Site ID: APN: Buena Vista Dairy VS307				
Project Site ID: Fresno to Bakersfield CMP				
Assessment Area Name: VS307				
Project Name: Fresno to Bakersfield HST	**Date (m/d/y)**	5	16	12

Assessment Team Members for This AA

E.Maroni

A. Langston

G. Peracca

Wetland Category:

X Natural ☐ Constructed ☐ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

☐ entire wetland ☐ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

☐ ponded/inundated ☐ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

☐ long-duration ☐ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

☐ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1255	North			
2	1256	South			
3	1254	East			
4	1257	West			
5					
6					

Comments:

Scoring Sheet: Vernal Pool Systems

AA Name: Buena Vista Dairy VS307					**(m/d/y)**	05/16/2012
Attributes and Metrics			Alpha.	Numeric	**Comments/Scores**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			A	12	Avg=55%	
(B): Percent of AA with Buffer	Alpha. A	Numeric 12			100% with buffer	
(C): Average Buffer Width	A	12			Avg=208.1 meters	
(D): Buffer Condition	B	9				
Initial Attribute Score $= A + [D \times (B \times C)^{1/2}]^{1/2}$				22.4	Final Attribute Score = (Initial Score/24) x 100	93.3
Hydrology						
Water Source			B	9		
Hydroperiod			A	12		
Hydrologic Connectivity			A	12		
Initial Attribute Score			33		Final Attribute Score = (Initial Score/36) x 100	91.7
Physical Structure						
Structural Patch Richness			B	9	8 patch types	
Pool and Swale Density			A	12	Avg=76.3%	
Topographic Complexity			C	6		
Initial Attribute Score			27		Final Attribute Score = (Initial Score/36) x 100	75
Biotic Structure						
Plant Community submetric A: Number of Co-dominant species	Alpha. B	Numeric 9			4.5 co-dominant spp.	
Plant Community submetric B: Percent Non Native	B	9			28.6% non-native spp.	
Plant Community submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Metric (*average of submetrics A-C*)				7		
Horizontal Interspersion and Zonation			B	9		
Initial Attribute Score			16		Final Attribute Score = (Initial Score/24) x 100	66.7
Overall AA Score (Average of Final Attribute Scores)					**81.7**	

Worksheet 9: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	X
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture	X	
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	X
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
Some evidence of active recreation present		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: A. Langston			
Assessment Area Name: Davis D301			
Assessment No.		**Date (mm/dd/yyyy):** 05/17/2012	

Assessment Team Members for This AA

G. Peracca

A. Langston

E. Maroni

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted **X** Other

Which best describes the type of depressional wetland?

[ ] freshwater marsh [ ] alkaline marsh [ ] alkali flat **X** other (specify):

Which best describes the hydrologic state of the wetland at the time of assessment?

[ ] ponded/inundated [ ] saturated soil, but no surface water **X** dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

[ ] long-duration [ ] medium-duration **X** short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes **X** no

Is the topographic basin of the wetland [ ] distinct **or** **X** indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1276	North			
2	1279	South			
3	1275	East			
4	1278	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: Davis D301				**Date:** 05/17/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		B	9		
Buffer submetric A: Percent of AA with Buffer	9			70% with buffer	
Buffer submetric B: Average Buffer Width	12			Avg= 250 meters	
Buffer submetric C: Buffer Condition	12				
$D + [C \times (A \times B)^{½}]^{½}$ **= Attribute Score**		Raw 20.2	Final 84	Final Attribute Score = (Raw Score/24)100	84
Hydrology					
Water Source		12		groundwater	
Hydroperiod or Channel Stability		9			
Hydrologic Connectivity		9		*would this be a "c" or "a". talk to Chad, old man-made basin	
Attribute Score		Raw 30	Final 83.3	Final Attribute Score = (Raw Score/36)100	83.3
Physical Structure					
Structural Patch Richness		3		2 patch types	
Topographic Complexity		6			
Attribute Score		Raw 9	Final 37.5	Final Attribute Score = (Raw Score/24)100	37.5
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	6			2 layers	
Plant Community submetric B: Number of Co-dominant species	3			3 co-dominant spp.	
Plant Community submetric C: Percent Invasion	12			0% invasion	
Plant Community Metric (*average of submetrics A-C*)		7			
Horizontal Interspersion and Zonation		9			
Vertical Biotic Structure		12			
Attribute Score		Raw 28	Final 77.8	Final Attribute Score = (Raw Score/36)100	77.8
Overall AA Score (Average of Final Attribute Scores)				**70.7**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)	X	
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)	X	
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: A. Langston		
Assessment Area Name: Davis D301A		
Assessment No.		**Date (mm/dd/yyyy):** 05/17/2012
Assessment Team Members for This AA		
G. Peracca		
A. Langston		
E. Maroni		

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted X Other

Which best describes the type of depressional wetland?

[ ] freshwater marsh [ ] alkaline marsh X alkali flat [ ] other (specify):

Which best describes the hydrologic state of the wetland at the time of assessment?

[ ] ponded/inundated [ ] saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

[ ] long-duration [ ] medium-duration X short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes X no

Is the topographic basin of the wetland [ ] distinct **or** X indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1280	North			
2	1282	South			
3	1283	East			
4	1281	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: Davis D301A				**Date:** 05/17/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		B	9	Avg=72.5%	
Buffer submetric A: Percent of AA with Buffer	9			65% with buffer	
Buffer submetric B: Average Buffer Width	12			Avg= 250 meters	
Buffer submetric C: Buffer Condition	12				
$D + [C \times (A \times B)^{1/2}]^{1/2}$ = **Attribute Score**		Raw	Final	Final Attribute Score =	
		20.2	84	(Raw Score/24)100	84
Hydrology					
Water Source		12		groundwater	
Hydroperiod or Channel Stability		9			
Hydrologic Connectivity		9			
Attribute Score		Raw	Final	Final Attribute Score =	
		30	83.3	(Raw Score/36)100	83.3
Physical Structure					
Structural Patch Richness		3		3 patch types	
Topographic Complexity		6			
Attribute Score		Raw	Final	Final Attribute Score =	
		9	37.5	(Raw Score/24)100	37.5
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	6			2 layers	
Plant Community submetric B: Number of Co-dominant species	3			1 co-dominant sp.	
Plant Community submetric C: Percent Invasion	12			0% invasion.	
Plant Community Metric (*average of submetrics A-C*)		7			
Horizontal Interspersion and Zonation		6			
Vertical Biotic Structure		12			
Attribute Score		Raw	Final	Final Attribute Score =	
		25	69.4	(Raw Score/36)100	69.4
Overall AA Score (Average of Final Attribute Scores)				**68.6**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows	X	
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)	X	
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information: Individual Vernal Pool

CRAM Site ID: Staffel

Project Site ID: Fresno to Bakersfield HST (CMP)

Assessment Area Name: V301

Project Name: Fresno to Bakersfield HST (CMP)	**Date (m/d/y)**	5	15	12

Assessment Team Members for This AA

G. Peracca

A. Langston

E. Maroni

Wetland Category:

X Natural ☐ Constructed ☐ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

☐ entire wetland ☐ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

☐ ponded/inundated ☐ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

☐ long-duration ☐ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

☐ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	5634	North			
2	5636	South			
3	5633	East			
4	5635	West			
5					
6					

Comments:

Scoring Sheet: Individual Vernal Pools

AA Name: V301					(m/d/y)	05/15/2012
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			A	12	Avg= 53%	
	Alpha.	Numeric				
(B): Percent of AA with Buffer	A	12			100% with buffer	
(C): Average Buffer Width	A	12			Avg=250m	
(D): Buffer Condition	B	9				
Initial Attribute Score = A + [D x (B x C)^{½}] ^{½}				22.4	Final Attribute Score = (Initial Score/24) x 100	93.3
Hydrology						
Water Source			B	9		
Hydroperiod			A	12		
Hydrologic Connectivity			A	12		
Initial Attribute Score				33	Final Attribute Score = (Initial Score/36) x 100	91.7
Physical Structure						
Structural Patch Richness			C	6	4 patch types	
Topographic Complexity			C	6		
Initial Attribute Score				12	Final Attribute Score = (Initial Score/24) x 100	50
Biotic Structure						
Horizontal Interspersion and Zonation			B	9		
	Alpha.	Numeric				
Community composition submetric A: Number of Co-dominants	A	12			7 co-dominant spp.	
Community composition submetric B: Percent Non-native	A	12			14% non-native spp.	
Community Composition submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Composition Metric (*numeric average of submetrics A-C*)				9		
Initial Attribute Score				18	Final Attribute Score = (Initial Score/24) x 100	75
Overall AA Score (Average of Final Attribute Scores)					**77.5**	

Worksheet 8: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
No stressors.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse	X	X
Comments		
No stressors.		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		
No stressors.		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	X
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information: Individual Vernal Pool

CRAM Site ID: Staffel				
Project Site ID: Fresno to Bakersfield HST (CMP)				
Assessment Area Name: V302				
Project Name: Fresno to Bakersfield HST (CMP)	**Date (m/d/y)**	5	15	12

Assessment Team Members for This AA

G. Peracca

A. Langston

E. Maroni

Wetland Category:

X Natural ☐ Constructed ☐ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

☐ entire wetland ☐ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

☐ ponded/inundated ☐ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

☐ long-duration ☐ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

☐ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	5643	North			
2	5641	South			
3	5642	East			
4	5640	West			
5					
6					

Comments: Presence of dumped trash; couch, refrigerator, oil drums, plastic tubing, plastic buckets

Scoring Sheet: Individual Vernal Pools

AA Name: V302				**(m/d/y)**	05/15/2012
Attributes and Metrics		**Alpha.**	**Numeric**	**Comments**	
Buffer and Landscape Context					
(A) Aquatic Area Connectivity		A	12	Avg= 57% Aqutic Area	
	Alpha. / Numeric				
(B): Percent of AA with Buffer	A / 12			100% with buffer	
(C): Average Buffer Width	A / 12			Avg=250 meters	
(D): Buffer Condition	B / 9			Litter present in AA	
Initial Attribute Score = A + [D x (B x C)^{½}] ^{½}			22.4	Final Attribute Score = (Initial Score/24) x 100	93.3
Hydrology					
Water Source		B	9		
Hydroperiod		A	12		
Hydrologic Connectivity		A	12		
Initial Attribute Score		33		Final Attribute Score = (Initial Score/36) x 100	91.7
Physical Structure					
Structural Patch Richness		D	3	2 patch types	
Topographic Complexity		C	6		
Initial Attribute Score		9		Final Attribute Score = (Initial Score/24) x 100	37.5
Biotic Structure					
Horizontal Interspersion and Zonation		C	6		
	Alpha. / Numeric				
Community composition submetric A: Number of Co-dominants	B / 9			5 co-dominant spp.	
Community composition submetric B: Percent Non-native	A / 12			20% non-native spp.	
Community Composition submetric C: Endemic Species Richness	D / 3			0 endemic spp.	
Plant Community Composition Metric (*numeric average of submetrics A-C*)			8		
Initial Attribute Score		14		Final Attribute Score = (Initial Score/24) x 100	58.3
Overall AA Score (Average of Final Attribute Scores)				**70.2**	

Worksheet 8: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
No stressors.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse	X	X
Comments		
Degrading waste (couch, refrigerator, oil buckets)		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		
No stressors.		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	X
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

CRAM Site ID: TeVelde				
Project Site ID: FB HST CMP				
Assessment Area Name: R300				
Project Name: FB HST Mitigation	**Date (m/d/y)**	05	14	12
Assessment Team Members for This AA:				
A. Langston				
G. Peracca				
E. Maroni				
Average Bankfull Width: 18 m				
Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m)**:** 180 m				
Upstream Point Latitude:	**Longitude:**			
Downstream Point Latitude:	**Longitude:**			

Wetland Sub-type:

X Confined ☐ Non-confined

AA Category:

☐ Restoration ☐ Mitigation ☐ Impacted X Ambient X Reference ☐ Training

☐ Other:

Did the river/stream have flowing water at the time of the assessment? ☐ yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. *Perennial* streams conduct water all year long, whereas *ephemeral* streams conduct water only during and immediately following precipitation events. *Intermittent* streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

☐ perennial X intermittent ☐ ephemeral

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	5620, 5621	Upstream			
2	5623	Middle Left			
3	5622	Middle Right			
4	5624	Downstream			
5					
6					
7					
8					
9					
10					

Site Location Description:

Comments:

Scoring Sheet: Riverine Wetlands

AA Name: R300					**(m/d/y)**	05	14	12
Attribute 1: Buffer and Landscape Context					**Comments**			
Aquatic Area Abundance Score (D)			Alpha.	Numeric				
			A	12	20 meters			
Buffer:								
Buffer submetric A: Percent of AA with Buffer	Alpha.	Numeric						
	A	12			100% with buffer			
Buffer submetric B: Average Buffer Width	D	3			Average = 8.8 meters			
Buffer submetric C: Buffer Condition	D	3			Buffer is road berm			
Raw Attribute Score = D+[C x (A x B)$^{1/2}$]$^{1/2}$ (use numerical value to nearest whole integer)				16.2	**Final Attribute Score = (Raw Score/24) x 100**			67.7
Attribute 2: Hydrology								
			Alpha.	Numeric				
Water Source			C	6	>20% drainage basin is agricultural			
Channel Stability			B	9				
Hydrologic Connectivity			C	6	Average = 1.2 meters			
Raw Attribute Score = sum of numeric scores				21	**Final Attribute Score = (Raw Score/36) x 100**			58.3
Attribute 3: Physical Structure								
			Alpha.	Numeric	2 patch types			
Structural Patch Richness			D	3				
Topographic Complexity			C	6				
Raw Attribute Score = sum of numeric scores				9	**Final Attribute Score = (Raw Score/24) x 100**			37.5
Attribute 4: Biotic Structure								
Plant Community Composition (based on sub-metrics A-C)								
	Alpha.	Numeric						
Plant Community submetric A: Number of plant layers	B	9			3 layers			
Plant Community submetric B: Number of Co-dominant species	C	6			7 co-dominant spp.			
Plant Community submetric C: Percent Invasion	C	6			43% invasive spp.			
Plant Community Composition (*average of submetrics A-C rounded to nearest whole integer*)				7				
Horizontal Interspersion			C	6				
Vertical Biotic Structure			C	6				
Raw Attribute Score = sum of numeric scores				19	**Final Attribute Score = (Raw Score/36) x 100**			52.8
Overall AA Score (average of four final Attribute Scores)					54.1			

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)	X	X
Flow diversions or unnatural inflows	X	X
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**	X	X
Plowing/Discing **(N/A for restoration areas)**	X	X
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)	X	X
Trash or refuse		
Comments		
Photos 5625-5627 are manure piles		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control	X	
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)	X	X
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

CRAM Site ID: TeVelde				
Project Site ID: FB HST CMP				
Assessment Area Name: R302				
Project Name: FB HST Mitigation	**Date (m/d/y)**	05	14	12
Assessment Team Members for This AA:				
A. Langston				
G. Peracca				
E. Maroni				
Average Bankfull Width: 5.4 meters				
Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m)**:** 100 meters				
Upstream Point Latitude:	**Longitude:**			
Downstream Point Latitude:	**Longitude:**			

Wetland Sub-type:

X Confined ☐ Non-confined

AA Category:

☐ Restoration ☐ Mitigation ☐ Impacted X Ambient X Reference ☐ Training

☐ Other:

Did the river/stream have flowing water at the time of the assessment? ☐ yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. *Perennial* streams conduct water all year long, whereas *ephemeral* streams conduct water only during and immediately following precipitation events. *Intermittent* streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

☐ perennial X intermittent ☐ ephemeral

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	5632	Upstream			
2	5630	Middle Left			
3	5631	Middle Right			
4	5628, 5629	Downstream			
5					
6					
7					
8					
9					
10					

Site Location Description:

Comments:

Scoring Sheet: Riverine Wetlands

AA Name: R302			**(m/d/y)** 05	14	12
Attribute 1: Buffer and Landscape Context			**Comments**		
	Alpha.	Numeric			
Aquatic Area Abundance Score (D)	A	12			
Buffer:					
	Alpha.	Numeric			
Buffer submetric A: Percent of AA with Buffer	A	12	100% w/buffer		
Buffer submetric B: Average Buffer Width	D	3	Average = 7.8 meters		
Buffer submetric C: Buffer Condition	D	3			
Raw Attribute Score = $D+[C \times (A \times B)^{½}]^{½}$ (use numerical value to nearest whole integer)		16.2	**Final Attribute Score = (Raw Score/24) x 100**		67.7
Attribute 2: Hydrology					
	Alpha.	Numeric			
Water Source	C	6			
Channel Stability	B	9			
Hydrologic Connectivity	A	12	Entrenchment ratio = 2.3		
Raw Attribute Score = sum of numeric scores		27	**Final Attribute Score = (Raw Score/36) x 100**		75
Attribute 3: Physical Structure					
	Alpha.	Numeric			
Structural Patch Richness	D	3	2 patch types		
Topographic Complexity	C	6			
Raw Attribute Score = sum of numeric scores		9	**Final Attribute Score = (Raw Score/24) x 100**		37.5
Attribute 4: Biotic Structure					
Plant Community Composition (based on sub-metrics A-C)					
	Alpha.	Numeric			
Plant Community submetric A: Number of plant layers	A	12	4 layers		
Plant Community submetric B: Number of Co-dominant species	B	9	10 co-dominant spp		
Plant Community submetric C: Percent Invasion	C	6	40% invasion		
Plant Community Composition (*average of submetrics A-C rounded to nearest whole integer*)		9			
Horizontal Interspersion	B	9			
Vertical Biotic Structure	C	6			
Raw Attribute Score = sum of numeric scores		24	**Final Attribute Score = (Raw Score/36) x 100**		67.7
Overall AA Score (average of four final Attribute Scores)			61.7		

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)	X	X
Flow diversions or unnatural inflows	X	X
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)	X	
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology	X	
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**	X	X
Plowing/Discing **(N/A for restoration areas)**	X	X
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)	X	X
Trash or refuse	X	
Comments		
Sediment is transported into drainage when farmer plows, discs, and grades adjacent fields.		
Assuming some bacteria/pathogen impairment from adjacent livestock waste piles.		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)	X	X
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Perennial Depressional Wetlands

Your Name: A. Langston		
Assessment Area Name: Valadez D303		
Assessment No.		**Date (mm/dd/yyyy):** 05/17/2012

Assessment Team Members for This AA

G. Peracca

A. Langston

E. Maroni

AA Category:

[ ] Restoration [ ] Mitigation [ ] Impacted **X** Other

Which best describes the type of depressional wetland?

[ ] freshwater marsh [ ] alkaline marsh [ ] alkali flat **X** other (specify):

Seasonal Basin.

Which best describes the hydrologic state of the wetland at the time of assessment?

[ ] ponded/inundated [ ] saturated soil, but no surface water **X** dry

What is the apparent hydrologic regime of the wetland?

Long-duration depressional wetlands are defined as supporting surface water for > 9 months of the year (in > 5 out of 10 years.) Medium-duration depressional wetlands are defined as supporting surface water for between 4 and 9 months of the year. Short-duration wetlands possess surface water between 2 weeks and 4 months of the year.

[ ] long-duration [ ] medium-duration **X** short-duration

Does your wetland connect with the floodplain of a nearby stream? [ ] yes **X** no

Is the topographic basin of the wetland [ ] distinct **or** **X** indistinct **?**

An indistinct, such as vernal pool complexes and large wet meadows, which may be intricately interspersed with uplands or seemingly homogeneous over very large areas, topographic basin is one that lacks obvious boundaries between wetland and upland. Examples of such features are seasonal, depressional wetlands in very low-gradient landscapes.

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1284	North			
2	1285	South			
3	1286	East			
4	1287	West			

Scoring Sheet: Perennial Depressional Wetlands

AA Name: Valadez D303				**Date:** 05/17/2012	
Attributes and Metrics		**Scores**		**Comments**	
Buffer and Landscape Context					
Landscape Connectivity (D)		3		Avg=8.8%	
Buffer submetric A: Percent of AA with Buffer	12			100% with buffer	
Buffer submetric B: Average Buffer Width	12			Avg= 232.5 meters	
Buffer submetric C: Buffer Condition	6				
$D + [C \times (A \times B)^{1/2}]^{1/2}$ **= Attribute Score**		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		11.5	47.9		47.9
Hydrology					
Water Source		9			
Hydroperiod or Channel Stability		9			
Hydrologic Connectivity		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		24	66.7		66.7
Physical Structure					
Structural Patch Richness		6		6 patch types	
Topographic Complexity		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		12	50		50
Biotic Structure					
Plant Community submetric A: Number of Plant Layers	9			3 layers	
Plant Community submetric B: Number of Co-dominant species	6			7 co-dominant spp.	
Plant Community submetric C: Percent Invasion	6			43% invasion	
Plant Community Metric (*average of submetrics A-C*)		7			
Horizontal Interspersion and Zonation		12			
Vertical Biotic Structure		6			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		25	69.4		69.4
Overall AA Score (Average of Final Attribute Scores)				**58.5**	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	**Present and likely to have negative effect on AA**	**Significant negative effect on AA**
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	**Present and likely to have negative effect on AA**	**Significant negative effect on AA**
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**	X	
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential	X	
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information: Individual Vernal Pool

CRAM Site ID: Valadez				
Project Site ID: FB HST Mitigation Site				
Assessment Area Name: V303				
Project Name: FB HST Mitigation Site	**Date (m/d/y)**	5	17	12
Assessment Team Members for This AA				
G. Peracca				
E. Maroni				
A. Langston				

Wetland Category:

X Natural □ Constructed □ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

X entire wetland □ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

□ ponded/inundated □ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

□ long-duration □ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

□ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1295	North			
2	1294	South			
3	1297	East			
4	1296	West			
5					
6					

Comments:

Scoring Sheet: Individual Vernal Pools

AA Name: V303					**(m/d/y)**	05/17/2012
Attributes and Metrics			**Alpha.**	**Numeric**	**Comments**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			D	3	Avg=2%	
	Alpha.	Numeric				
(B): Percent of AA with Buffer	A	12			100% with buffer	
(C): Average Buffer Width	A	12			Avg=250 m	
(D): Buffer Condition	B	9				
Initial Attribute Score $= A + [D \times (B \times C)^{½}]^{½}$				13.4	Final Attribute Score = (Initial Score/24) x 100	55.8
Hydrology						
Water Source			A	12		
Hydroperiod			A	12		
Hydrologic Connectivity			A	12		
Initial Attribute Score				36	Final Attribute Score = (Initial Score/36) x 100	100
Physical Structure						
Structural Patch Richness			D	3	2 patch types	
Topographic Complexity			C	6		
Initial Attribute Score				9	Final Attribute Score = (Initial Score/24) x 100	37.5
Biotic Structure						
Horizontal Interspersion and Zonation			D	3		
Community composition submetric A: Number of Co-dominants	Alpha. C	Numeric 6			3 co-dominant spp.	
Community composition submetric B: Percent Non-native	B	9			33% non-native spp.	
Community Composition submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Composition Metric (*numeric average of submetrics A-C*)				6		
Initial Attribute Score				9	Final Attribute Score = (Initial Score/24) x 100	37.5
Overall AA Score (Average of Final Attribute Scores)					**57.7**	

Worksheet 8: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)	X	
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential	X	
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor	X	X
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information: Vernal Pool Systems

CRAM Site ID: Yang Property (CMP)				
Project Site ID: Fresno to Bakersfield HST				
Assessment Area Name: VS300				
Project Name: Fresno to Bakersfield HST (CMP)	**Date (m/d/y)**	5	17	12

Assessment Team Members for This AA

A. Langston G. Peracca

E.Maroni

Wetland Category:

X Natural □ Constructed □ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

□ entire wetland □ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

□ ponded/inundated □ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

□ long-duration □ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

□ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1267	North	35.80388N	119.39008W	
2	1268	South			
3	1269	East			
4	1270	West			
5					
6					

Comments:

Scoring Sheet: Vernal Pool Systems

AA Name: VS300				**(m/d/y)**	05/19/2012
Attributes and Metrics		Alpha.	Numeric	**Comments/Scores**	
Buffer and Landscape Context					
(A) Aquatic Area Connectivity		A	12	Avg=57.5%	
(B): Percent of AA with Buffer	Alpha. A / Numeric 12			100% with buffer	
(C): Average Buffer Width	A / 12			Avg=196.9 meters	
(D): Buffer Condition	B / 9				
Initial Attribute Score $= A + [D \times (B \times C)^{1/2}]^{1/2}$			22.4	Final Attribute Score = (Initial Score/24) x 100	93.3
Hydrology					
Water Source		B	9		
Hydroperiod		A	12		
Hydrologic Connectivity		A	12		
Initial Attribute Score		33		Final Attribute Score = (Initial Score/36) x 100	91.7
Physical Structure					
Structural Patch Richness		C	6	7 patch types	
Pool and Swale Density		A	12	Avg=68.8 %	
Topographic Complexity		C	6		
Initial Attribute Score		24		Final Attribute Score = (Initial Score/36) x 100	66.7
Biotic Structure					
Plant Community submetric A: Number of Co-dominant species	Alpha. C / Numeric 6			Avg = 3 co-dominant spp.	
Plant Community submetric B: Percent Non Native	C / 6			37.5% non-native spp.	
Plant Community submetric C: Endemic Species Richness	D / 3			0 endemic spp.	
Plant Community Metric (*average of submetrics A-C*)			5		
Horizontal Interspersion and Zonation		B	9		
Initial Attribute Score		14		Final Attribute Score = (Initial Score/24) x 100	58.3
Overall AA Score (Average of Final Attribute Scores)				**77.5**	

Worksheet 9: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	**Present**	**Present and likely to have significant negative effect on AA**
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
No Stressors.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	**Present**	**Present and likely to have significant negative effect on AA**
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
No Stressors.		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		
No Stressors.		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	X
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
BNSF railroad corridor.		

Basic Information: Vernal Pool Systems

CRAM Site ID: Yang Property (CMP)

Project Site ID: Fresno to Bakersfield HST

Assessment Area Name: VS301

Project Name: Fresno to Bakersfield HST (CMP)	**Date (m/d/y)**	5	15	12

Assessment Team Members for This AA

A. Langston G. Peracca

E. Maroni

Wetland Category:

X Natural ☐ Constructed ☐ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:

☐ entire wetland ☐ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?

☐ ponded/inundated ☐ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

☐ long-duration ☐ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?

☐ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	**Description**	**Latitude**	**Longitude**	**Datum**
1	5653	North	35º48’01 N	119º23’25 W	
2	5657	South			
3	5656	East			
4	5654	West			
5					
6					

Comments:,

Scoring Sheet: Vernal Pool Systems

AA Name: VS301			**(m/d/y)**	05/15/2012
Attributes and Metrics	Alpha.	Numeric	**Comments/Scores**	
Buffer and Landscape Context				
(A) Aquatic Area Connectivity	A	12	Avg= 92.9%	
(B): Percent of AA with Buffer	A	12	100% with buffer	
(C): Average Buffer Width	A	12	Avg= 250 meters	
(D): Buffer Condition	B	9		
Initial Attribute Score $= A + [D \times (B \times C)^{1/2}]^{1/2}$		22.4	Final Attribute Score = (Initial Score/24) x 100	93.3
Hydrology				
Water Source	B	9		
Hydroperiod	A	12		
Hydrologic Connectivity	A	12		
Initial Attribute Score		33	Final Attribute Score = (Initial Score/36) x 100	91.7
Physical Structure				
Structural Patch Richness	C	6	7 patch types	
Pool and Swale Density	A	12	Avg= 52.5 %	
Topographic Complexity	A	12		
Initial Attribute Score		30	Final Attribute Score = (Initial Score/36) x 100	83.3
Biotic Structure				
Plant Community submetric A: Number of Co-dominant species	B	9	Avg = 4.7 co-dominant spp.	
Plant Community submetric B: Percent Non Native	D	3	50% non-native spp.	
Plant Community submetric C: Endemic Species Richness	D	3	0 endemic spp.	
Plant Community Metric (*average of submetrics A-C*)		5		
Horizontal Interspersion and Zonation	A	12		
Initial Attribute Score		17	Final Attribute Score = (Initial Score/24) x 100	70.8
Overall AA Score (Average of Final Attribute Scores)			**84.8**	

Worksheet 9: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
No Stressors.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
No Stressors.		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		
No Stressors.		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries	X	X
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information: Vernal Pool Systems

CRAM Site ID: Yang Property (CMP)				
Project Site ID: Fresno to Bakersfield HST				
Assessment Area Name: VS303				
Project Name: Fresno to Bakersfield HST (CMP)	**Date (m/d/y)**	5	15	12
Assessment Team Members for This AA				
A. Langston G. Peracca				
E.Maroni				

Wetland Category:
X Natural □ Constructed □ Restoration (Rehabilitation OR Enhancement)

If Created or Restored, does the action encompass:
□ entire wetland □ portion of the wetland

What best describes the hydrologic state of the wetland at the time of assessment?
□ ponded/inundated □ saturated soil, but no surface water X dry

What is the apparent hydrologic regime of the wetland?

□ long-duration □ medium-duration X short-duration

Does the vernal pool system connect with the floodplain of a nearby stream?
□ yes X no

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	5651	North			
2	5649	South			
3	5652	East			
4	5650	West			
5					
6					

Comments:

Scoring Sheet: Vernal Pool Systems

AA Name: VS303					**(m/d/y)**	05/15/2012
Attributes and Metrics			Alpha.	Numeric	**Comments/Scores**	
Buffer and Landscape Context						
(A) Aquatic Area Connectivity			A	12	Avg= 95%	
(B): Percent of AA with Buffer	Alpha. A	Numeric 12			100% with buffer	
(C): Average Buffer Width	A	12			Avg= 250 meters	
(D): Buffer Condition	B	9				
Initial Attribute Score $= A + [D \times (B \times C)^{1/2}]^{1/2}$				22.4	Final Attribute Score = (Initial Score/24) x 100	93.3
Hydrology						
Water Source			B	9		
Hydroperiod			A	12		
Hydrologic Connectivity			A	12		
Initial Attribute Score			33		Final Attribute Score = (Initial Score/36) x 100	91.7
Physical Structure						
Structural Patch Richness			B	9	9 patch types	
Pool and Swale Density			A	12	Avg= 76.3 %	
Topographic Complexity			C	6		
Initial Attribute Score			27		Final Attribute Score = (Initial Score/36) x 100	75.0
Biotic Structure						
Plant Community submetric A: Number of Co-dominant species	Alpha. B	Numeric 9			Avg = 4 co-dominant spp.	
Plant Community submetric B: Percent Non Native	C	6			43% non-native spp.	
Plant Community submetric C: Endemic Species Richness	D	3			0 endemic spp.	
Plant Community Metric (*average of submetrics A-C*)				6		
Horizontal Interspersion and Zonation			B	9		
Initial Attribute Score			15		Final Attribute Score = (Initial Score/24) x 100	62.5
Overall AA Score (Average of Final Attribute Scores)					**80.6**	

Worksheet 9: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
No Stressors.		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and likely to have significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
No Stressors.		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Present and Likely to Have Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		
No Stressors.		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Present and likely to have significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
No Stressors.		

Basic Information Sheet: Riverine Wetlands

CRAM Site ID: Clark River Ranch				
Project Site ID: FB HST CMP				
Assessment Area Name: R401				
Project Name: FB HST Mitigation	**Date (m/d/y)**	01	03	13

Assessment Team Members for This AA:

A. Langston

T. Lim

Average Bankfull Width: 33 m

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m)**:** 200 m

Upstream Point Latitude: **Longitude:**

Downstream Point Latitude: **Longitude:**

Wetland Sub-type:

X Confined ☐ Non-confined

AA Category:

☐ Restoration ☐ Mitigation ☐ Impacted X Ambient X Reference ☐ Training

☐ Other:

Did the river/stream have flowing water at the time of the assessment? ☐ yes X no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. *Perennial* streams conduct water all year long, whereas *ephemeral* streams conduct water only during and immediately following precipitation events. *Intermittent* streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

X perennial ☐ intermittent ☐ ephemeral

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1977	Upstream			
2	1973, 1974	Middle Left			
3	1975, 1976	Middle Right			
4	1972	Downstream			
5					
6					
7					
8					
9					
10					

Site Location Description:

Clarks Fork Kings River

Comments:

Scoring Sheet: Riverine Wetlands

AA Name: R401				**(m/d/y)**	01 / 03 / 13
Attribute 1: Buffer and Landscape Context				**Comments**	
Aquatic Area Abundance Score (D)		Alpha. A	Numeric 12	100m total non-buffer	
Buffer:					
Buffer submetric A: Percent of AA with Buffer	Alpha. A	Numeric 12		100% with buffer	
Buffer submetric B: Average Buffer Width	D	3		Average = 19.6 meters	
Buffer submetric C: Buffer Condition	C	6		Buffer is road berm	
Raw Attribute Score = $D+[C \times (A \times B)^{1/2}]^{1/2}$ (use numerical value to nearest whole integer)			18	**Final Attribute Score = (Raw Score/24) x 100**	75.0
Attribute 2: Hydrology					
Water Source		Alpha. C	Numeric 6	>20% drainage basin is agricultural	
Channel Stability		B	9		
Hydrologic Connectivity		B	9	Average = 1.63 meters	
Raw Attribute Score = sum of numeric scores			24	**Final Attribute Score = (Raw Score/36) x 100**	66.7
Attribute 3: Physical Structure					
Structural Patch Richness		Alpha. D	Numeric 3	0 patch types	
Topographic Complexity		C	6		
Raw Attribute Score = sum of numeric scores			9	**Final Attribute Score = (Raw Score/24) x 100**	37.5
Attribute 4: Biotic Structure					
Plant Community Composition (based on sub-metrics A-C)					
Plant Community submetric A: Number of plant layers	Alpha. B	Numeric 9		3 layers	
Plant Community submetric B: Number of Co-dominant species	C	6		6 co-dominant spp.	
Plant Community submetric C: Percent Invasion	B	9		17% invasive spp.	
Plant Community Composition (*average of submetrics A-C rounded to nearest whole integer*)			8		
Horizontal Interspersion		C	6		
Vertical Biotic Structure		C	6		
Raw Attribute Score = sum of numeric scores			20	**Final Attribute Score = (Raw Score/36) x 100**	55.6
Overall AA Score (average of four final Attribute Scores)				58.7	

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	X
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology	X	X
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**	X	
Plowing/Discing **(N/A for restoration areas)**	X	X
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed	X	X
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture	X	X
Orchards/nurseries	X	X
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

CRAM Site ID: Clark River Ranch				
Project Site ID: FB HST CMP				
Assessment Area Name: R402				
Project Name: FB HST Mitigation	**Date (m/d/y)**	01	04	13
Assessment Team Members for This AA:				
A. Langston				
T. Lim				
Average Bankfull Width: 31 m				
Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m)**:** 200 m				
Upstream Point Latitude:	**Longitude:**			
Downstream Point Latitude:	**Longitude:**			
Wetland Sub-type: X Confined ☐ Non-confined				
AA Category: ☐ Restoration ☐ Mitigation ☐ Impacted X Ambient X Reference ☐ Training ☐ Other:				
Did the river/stream have flowing water at the time of the assessment? ☐ yes X no				
What is the apparent hydrologic flow regime of the reach you are assessing? The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. *Perennial* streams conduct water all year long, whereas *ephemeral* streams conduct water only during and immediately following precipitation events. *Intermittent* streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source. X perennial ☐ intermittent ☐ ephemeral				

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1	1996	Upstream			
2	1994	Middle Left			
3	1995	Middle Right			
4	1993	Downstream			
5					
6					
7					
8					
9					
10					

Site Location Description:

"Island" area of River Ranch.

Comments:

1-sided AA due to presence of water and steep banks.

Additional photos: 1997-2001

Scoring Sheet: Riverine Wetlands

AA Name: R402					(m/d/y)	01	04	13
Attribute 1: Buffer and Landscape Context					**Comments**			
			Alpha.	Numeric				
Aquatic Area Abundance Score (D)			B	9	100m total non-buffer (1-sided)			
Buffer:								
	Alpha.	Numeric						
Buffer submetric A: Percent of AA with Buffer	A	12			100% with buffer			
Buffer submetric B: Average Buffer Width	D	3			Average = 7 meters			
Buffer submetric C: Buffer Condition	C	6			Buffer is road berm			
Raw Attribute Score = D+[C x (A x B)$^{1/2}$]$^{1/2}$ (use numerical value to nearest whole integer)				15	**Final Attribute Score = (Raw Score/24) x 100**			62.5
Attribute 2: Hydrology								
			Alpha.	Numeric				
Water Source			C	6	>20% drainage basin is agricultural			
Channel Stability			B	9				
Hydrologic Connectivity			C	6	Average = 1.54 meters			
Raw Attribute Score = sum of numeric scores				21	**Final Attribute Score = (Raw Score/36) x 100**			58.3
Attribute 3: Physical Structure								
			Alpha.	Numeric				
Structural Patch Richness			C	6	5 patch types			
Topographic Complexity			C	6				
Raw Attribute Score = sum of numeric scores				12	**Final Attribute Score = (Raw Score/24) x 100**			50.0
Attribute 4: Biotic Structure								
Plant Community Composition (based on sub-metrics A-C)								
	Alpha.	Numeric						
Plant Community submetric A: Number of plant layers	B	9			3 layers			
Plant Community submetric B: Number of Co-dominant species	C	6			5 co-dominant spp.			
Plant Community submetric C: Percent Invasion	B	9			20% invasive spp.			
Plant Community Composition (*average of submetrics A-C rounded to nearest whole integer*)				8				
Horizontal Interspersion			B	9				
Vertical Biotic Structure			B	9				
Raw Attribute Score = sum of numeric scores				26	**Final Attribute Score = (Raw Score/36) x 100**			72.2
Overall AA Score (average of four final Attribute Scores)					60.8			

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows	X	X
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees	X	X
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology	X	X
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**	X	X
Plowing/Discing **(N/A for restoration areas)**	X	X
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed	X	X
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)	X	X
Dryland farming		
Intensive row-crop agriculture	X	X
Orchards/nurseries	X	X
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Appendix D

Photographs of Representative Assessment Areas

Appendix D

Photographs of Representative Assessment Areas

Assessment Area D147

North

South

Northwest

Southwest

Assessment Area D203

North

South

East

West

Assessment Area D204

North

South

East

West

Assessment Area D205

North

South

East

West

Assessment Area D206

North

South

East

West

Assessment Area D212

North

South

East

West

Assessment Area D213

North

South

East

West

Assessment Area D214

North

South

East

West

Assessment Area R8

Northeast

Southeast

Northwest

Southwest

Assessment Area R63A

North

South

East

West

Assessment Area R66

North

South

East

West

Assessment Area R71A

North

South

East

West

Assessment Area R146

North

South

East

N/A

West

Assessment Area R149

Northeast

Southeast

Northwest

Southwest

Assessment Area 150

Northeast

Southeast

Northwest

Southwest

Assessment Area R157A

North

N/A

South

East

West

Assessment Area R160

N/A	N/A

North	South
	
East	West

Assessment Area R203

Northeast

Southeast

Northwest

Southwest

Assessment Area R205

Northwest

Southeast

Northwest

Southwest

Assessment Area R208

Northeast

Southeast

Northwest

Southwest

Assessment Area R209

N/A	N/A

North	South
	
East	West

Assessment Area R211

Northeast

Southeast

N/A	N/A
Northwest	**Southwest**

Assessment Area R212

Northeast

Southeast

Northwest

Southwest

Assessment Area R213

Northeast

Southeast

Northwest

Southwest

Assessment Area R220

Northeast

Southeast

Northwest

Southwest

Assessment Area V62A

North

South

East

West

Assessment Area V65

North

South

East

West

Assessment Area V70

North

South

East

West

Assessment Area V72

North

South

East

West

Assessment Area V74

North

South

East

West

Assessment Area V75

North

South

East

West

Assessment Area V76A

North

South

East

West

Assessment Area V76D

North

South

East

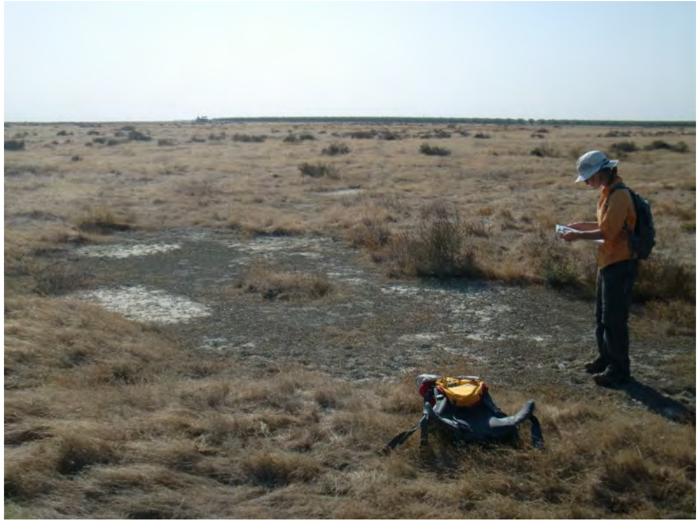
West

Assessment Area V104

North

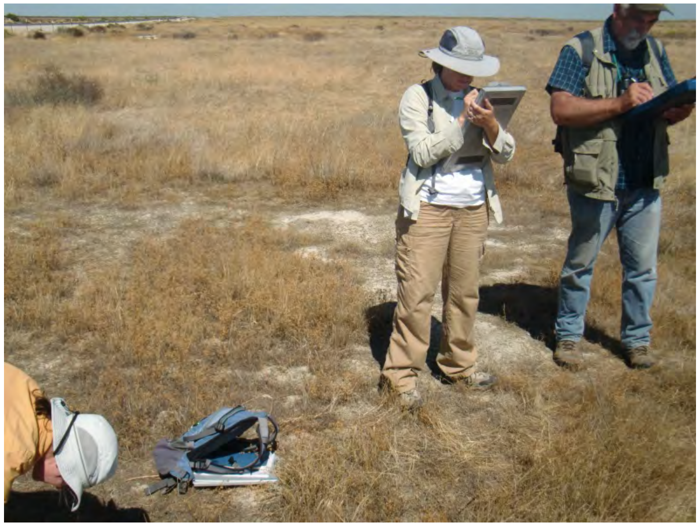
South

East



West

Assessment Area V114



North

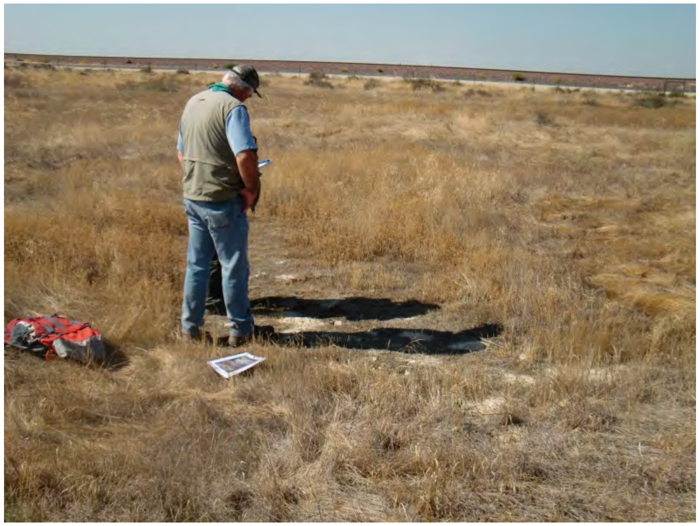
South

East

West

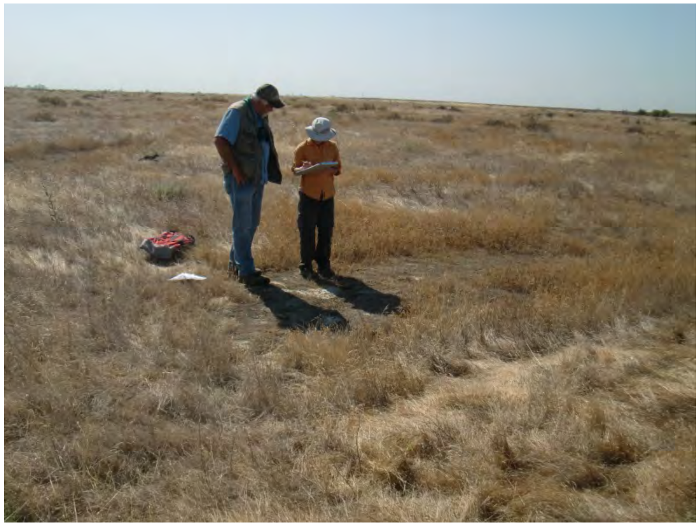
Assessment Area V115A

North



South

East



West

Assessment Area VS97A

North

South

East

West

Assessment Area VS99A

North | **South**

East | **West**

Assessment Area VS104A

North

South

East

West

Assessment Area VS107A

North

South

East

West

Assessment Area VS112

North

South

East

West

Assessment Area VS114A

North

South

East

West

Buena Vista Dairy D304

North

South

East

West

Buena Vista Dairy D305

North

South

East

West

Buena Vista Dairy V305

North

South

East

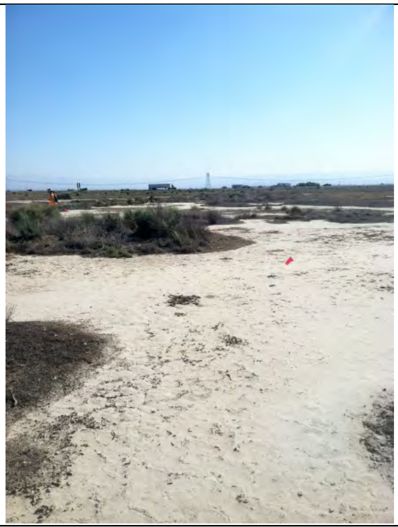
West

Buena Vista Dairy VS305

North

South

East



West

Buena Vista Dairy VS307

North

South

East

West

Davis D301

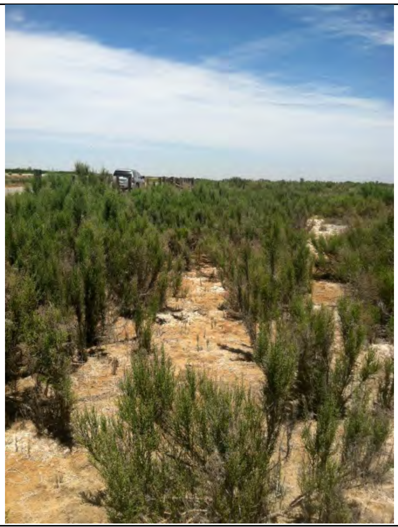
North

South

East

West

Davis D301A



North

South

East

West

Staffel V301

North

South

East

West

Staffel V302

North

South

East

West

Te Velde R300

Upstream

Middle Left

Middle Right

Downstream

Te Velde R302

Upstream

Middle Left

Middle Right

Downstream

Valadez D303

North

South

East

West

Valadez V303

North

South

East

West

Yang VS300

North

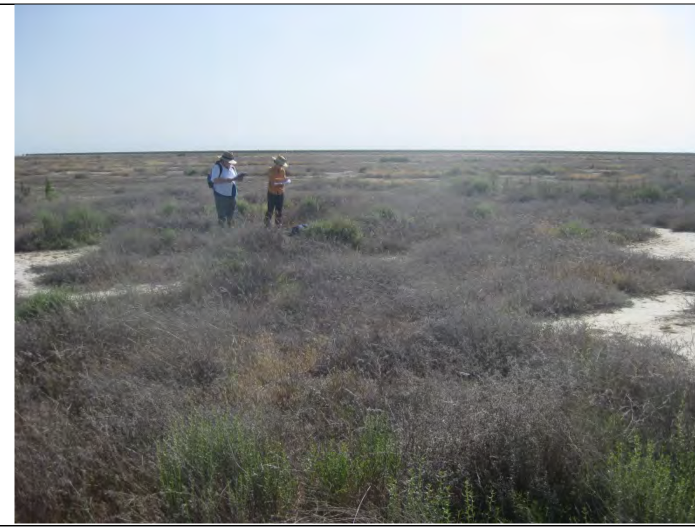
South

East

West

Yang VS301

North



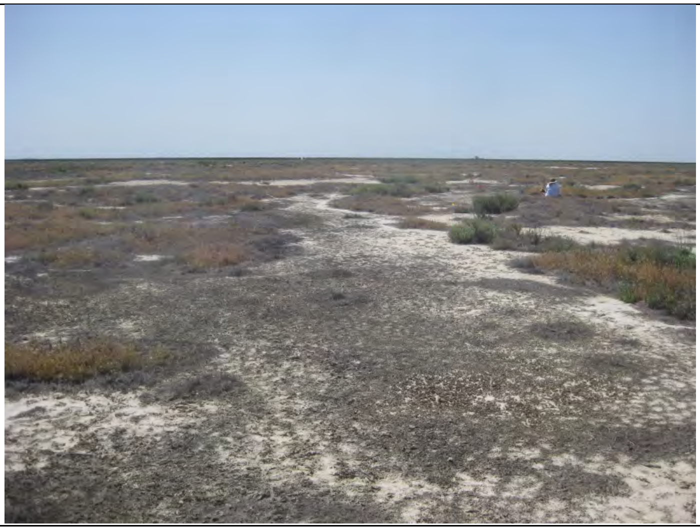
South

East

West

Yang VS303

North



South

East

West

Clark River Ranch R401

Upstream

Middle Left

Middle Right

Downstream

Clark River Ranch R402

Upstream

Middle Left

Middle Right

Downstream

Appendix E
Summary Table of Stressors

Table E-1
Summary Table of Stressors for Project AAs

Attribute	Stressor	Assessment Areas (non-bold X=stressor present and likely to have a negative effect on AA; bold X=stressor has significant negative effect on AA)																																									
		V62A	V65	V70	V72	V74	V75	V76A	V76D	V104	V114	V115A	VS97A	VS99A	VS104A	VS107A	VS112	VS114A	D147	D203	D204	D205	D206	D212	D213	D214	R8	R63A	R66	R71A	R146	R149	R150	R157A	R160	R203	R205	R208	R209	R212	R213	R211	R220
Hydrology Attribute (within 50 M of AA)	Point source discharges																																										
	Non-point source discharges																					X							X				X							X		X	X
	Flow diversions/ unnatural inflows																		**X**																								
	Dams																										**X**										X						
	Flow obstructions			X	X	X	X	X	X										**X**								**X**			X							X						
	Weir/drop structure, tide gates																										**X**																
	Dredged inlet/ channel																																										
	Engineered channel																															X	X										
	Dike/levees	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	**X**									X	X	X	**X**	X	**X**		X					X	X	X	X
	Ground-water extraction																																										
	Ditches																																										
	Actively managed hydrology																		**X**	X							**X**			X										**X**	X	X	
Physical Structure Attribute (within 50 M of AA)	Filling or dumping of sediments of soils												X																														
	Grading/ compaction	X	X	X	X	X	X				X						X		**X**									X	X	X	**X**				**X**								
	Plowing/ disking																																			X	X			X	X	X	
	Resource extraction																																										
	Vegetation manage-ment	X																									X	X	X		**X**	X	X										
	Excessive sediment or organic debris from watershed																										**X**						**X**				X						
	Excessive runoff from watershed																																		X								
	Nutrient impaired																		**X**																								

Table E-1
Summary Table of Stressors for Project AAs

Attribute	Stressor	Assessment Areas (non-bold X=stressor present and likely to have a negative effect on AA; bold X=stressor has significant negative effect on AA)																																									
		V62A	**V65**	**V70**	**V72**	**V74**	**V75**	**V76A**	**V76D**	**V104**	**V114**	**V115A**	**VS97A**	**VS99A**	**VS104A**	**VS107A**	**VS112**	**VS114A**	**D147**	**D203**	**D204**	**D205**	**D206**	**D212**	**D213**	**D214**	**R8**	**R63A**	**R66**	**R71A**	**R146**	**R149**	**R150**	**R157A**	**R160**	**R203**	**R205**	**R208**	**R209**	**R212**	**R213**	**R211**	**R220**
Physical Structure Attribute (within 50 M of AA)	Heavy metal impaired																																										
	Pesticides or trace organics impaired																														**X**												
	Bacteria and pathogens impaired																																										
	Trash or refuse			**X**	**X**	X	X													X	X									X	X		X	X	X							X	
Biotic Structure Attribute (within 50 M of AA)	Mowing, grazing, excessive herbivory																																										
	Excessive human visitation																			X	X						X							**X**									X
	Predation and habitat destruction by non-native vertebrates																																										
	Tree cutting/ sapling removal																																X										
	Removal of woody debris																															X	X										
	Treatment of non-native and nuisance plant species	X																										X	X		X												
	Pesticide application or vector control	X																	X					X	X	X		X			**X**									X	X	X	
	Biological resource extraction or stocking																																										
	Excessive organic debris in matrix					X																																					

Table E-1
Summary Table of Stressors for Project AAs

Attribute	Stressor	Assessment Areas (non-bold X=stressor present and likely to have a negative effect on AA; bold X=stressor has significant negative effect on AA)																																									
		V62A	V65	V70	V72	V74	V75	V76A	V76D	V104	V114	V115A	VS97A	VS99A	VS104A	VS107A	VS112	VS114A	D147	D203	D204	D205	D206	D212	D213	D214	R8	R63A	R66	R71A	R146	R149	R150	R157A	R160	R203	R205	R208	R209	R212	R213	R211	R220
Biotic Structure Attribute (within 50 M of AA)	Lack of vegetation manage-ment to conserve natural resources																																										
	Lack of treatment of invasive plants							X																																			
Buffer and Landscape Context Attribute (within 500 M of AA)	Urban residential																																	X	**X**								
	Industrial/commercial																				X	**X**	X											X	**X**								
	Military training/air traffic																																										
	Dams																										**X**																
	Dryland farming			X	X	X	X	X	X																					X													
	Intensive row-crop agriculture																			X						X	**X**											X	**X**	X	X	X	
	Orchards/ nurseries	X	X							X			X	X	X	X			**X**	X						**X**	**X**	X	X		**X**	**X**	X			X	X	X		X	X	X	X
	Commercial feedlots																																						X				
	Dairies																																										
	Ranching																																						X				
	Transporta-tion corridor	**X**	X							X	X	X	**X**	X	X	X	X	X	**X**							X		**X**	**X**		**X**	X	X	X	**X**	X				X	X	X	
	Rangeland																																										
	Sports fields and urban parklands																																	**X**	X								
	Passive recreation																																	X	X								
	Active recreation																										X																X
	Physical resource extraction																																	X	X								
	Biological resource extraction																																										
	TOTAL	**7**	**4**	**5**	**5**	**6**	**5**	**4**	**3**	**3**	**3**	**2**	**4**	**2**	**3**	**2**	**3**	**2**	**9**	**5**	**3**	**2**	**1**	**1**	**1**	**4**	**11**	**7**	**7**	**6**	**9**	**6**	**10**	**8**	**10**	**3**	**5**	**2**	**3**	**8**	**7**	**9**	**5**

Acronyms:
AA = assessment area M = meter(s)

Table E-2
Summary Table of Stressors for Potential Mitigation Sites

Attribute	Stressor	Assessment Areas (non-bold X=stressor present and likely to have a negative effect on AA; bold X=stressor has significant negative effect on AA)																	
		Buena Vista Dairy					Davis		Staffel		Te Velde		Valadez		Yang			Clark River Ranch	
		D304	D305	V305	VS305	VS307	D301	D301A	V301	V302	R300	R302	D303	V303	VS300	VS301	VS303	R401	R402
Hydrology Attribute (within 50 M of AA)	Point source discharges																		
	Non-point source discharges										X	X							
	Flow diversions/ unnatural inflows										**X**	**X**							**X**
	Dams																		
	Flow obstructions						X	X											
	Weir/drop structure, tide gates																		
	Dredged inlet/ channel																		
	Engineered channel																		
	Dike/levees	X	X	X	X	X												**X**	**X**
	Groundwater extraction																		
	Ditches																		
	Actively managed hydrology																	**X**	**X**
Physical Structure Attribute (within 50 M of AA)	Filling or dumping of sediments of soils																		
	Grading/ compaction										X	X	X					**X**	**X**
	Plowing/disking										X	X						**X**	**X**
	Resource extraction																		
	Vegetation manage-ment																		
	Excessive sediment or organic debris from watershed																	**X**	**X**
	Excessive runoff from watershed																		
	Nutrient impaired																		
Physical Structure Attribute (within 50 M of AA)	Heavy metal impaired																		
	Pesticides or trace organics impaired																		
	Bacteria and pathogens impaired										**X**	**X**							
	Trash or refuse								X	X									

Table E-2
Summary Table of Stressors for Potential Mitigation Sites

Attribute	Stressor	Assessment Areas (non-bold X=stressor present and likely to have a negative effect on AA; bold X=stressor has significant negative effect on AA)																	
		Buena Vista Dairy					Davis		Staffel		Te Velde		Valadez		Yang			Clark River Ranch	
		D304	D305	V305	VS305	VS307	D301	D301A	V301	V302	R300	R302	D303	V303	VS300	VS301	VS303	R401	R402
Biotic Structure Attribute (within 50 M of AA)	Mowing, grazing, excessive herbivory																		
	Excessive human visitation																		
	Predation and habitat destruction by non-native vertebrates																		
	Tree cutting/ sapling removal																		
	Removal of woody debris																		
	Treatment of non-native and nuisance plant species																		
	Pesticide application or vector control																		
	Biological resource extraction or stocking																		
	Excessive organic debris in matrix																		
	Lack of vegetation management to conserve natural resources																		
	Lack of treatment of invasive plants																		
Buffer and Landscape Context Attribute (within 500 M of AA)	Urban residential												X						
	Industrial/commercial																		
	Military training/air traffic																		
	Dams																		**X**
	Dryland farming																		
	Intensive row-crop agriculture	X	X															**X**	**X**
	Orchards/nurseries								X	X					X	X		**X**	**X**
	Commercial feedlots																		
	Dairies																		
	Ranching										X	X							
	Transportation corridor			X	X	X	X	X					X	X					
	Rangeland																		
	Sports fields and urban parklands																		
	Passive recreation						X	X											
	Active recreation	X	X																
	Physical resource extraction																		
	Biological resource extraction																		
	TOTAL	**3**	**3**	**2**	**2**	**2**	**3**	**3**	**2**	**2**	**6**	**6**	**3**	**1**	**1**	**1**	**0**	**7**	**9**

Acronyms
AA assessment area
M meter(s)

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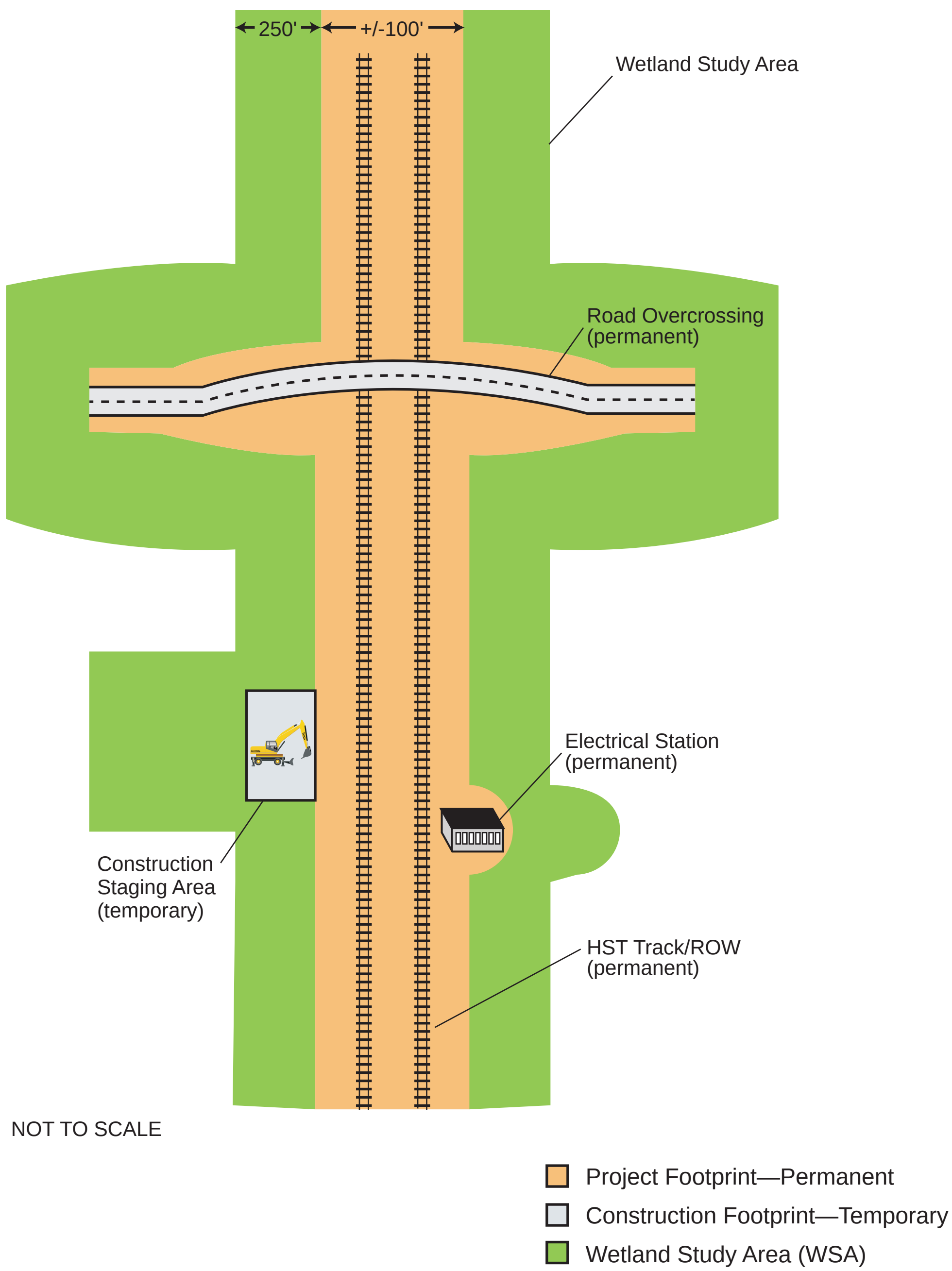
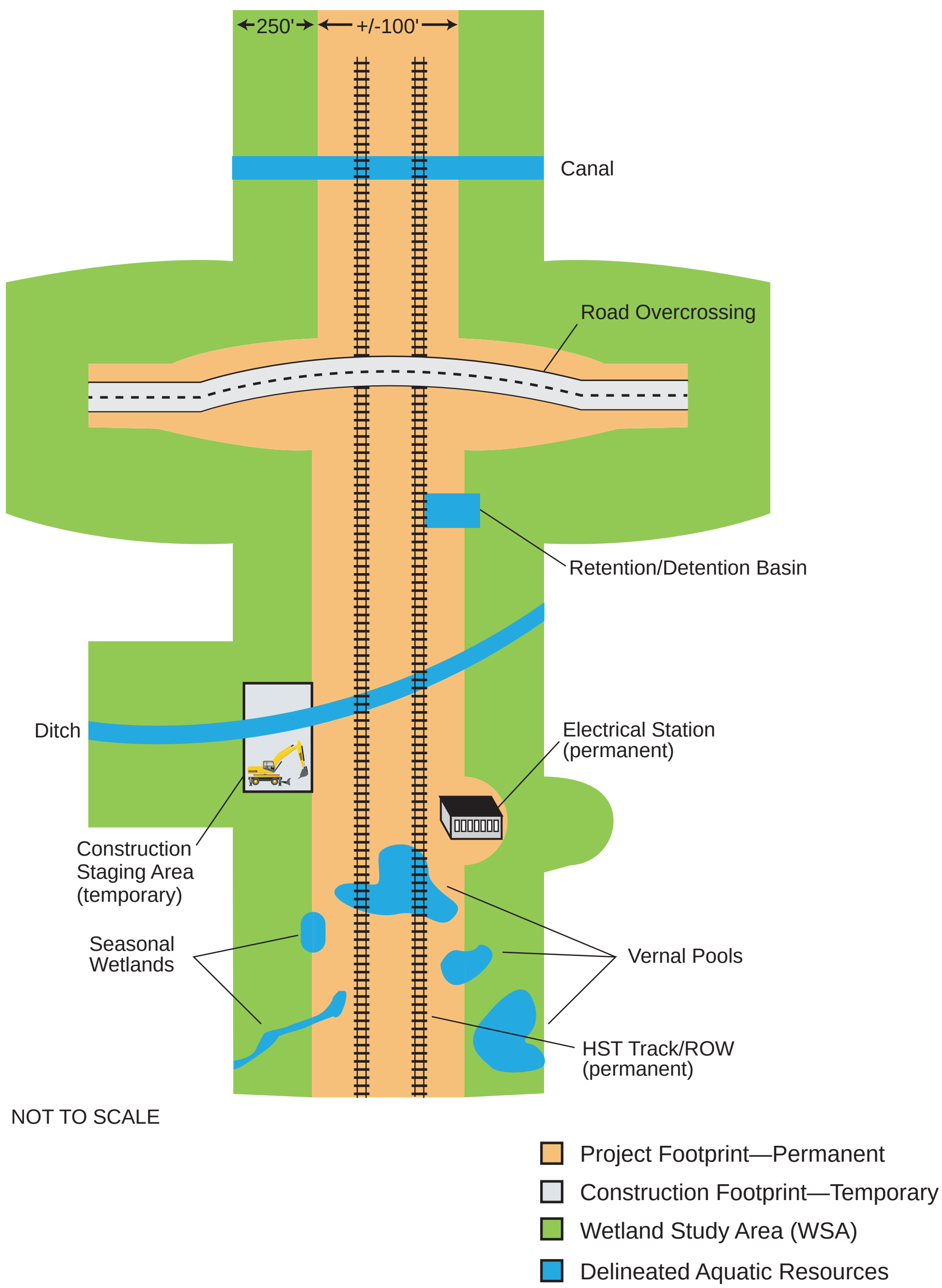
Appendix B
Impact Evaluation Schematics

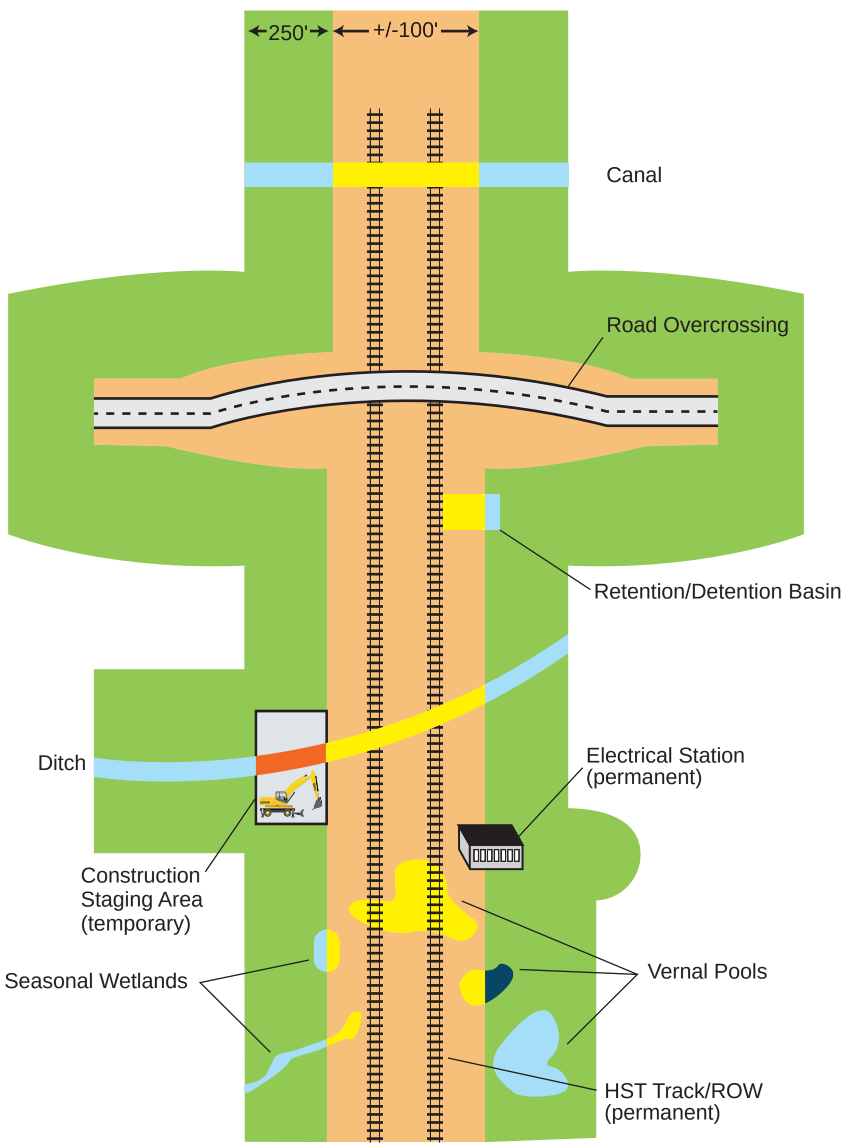
Project and Construction Footprint



Wetland Delineation



Construction and Project Impacts

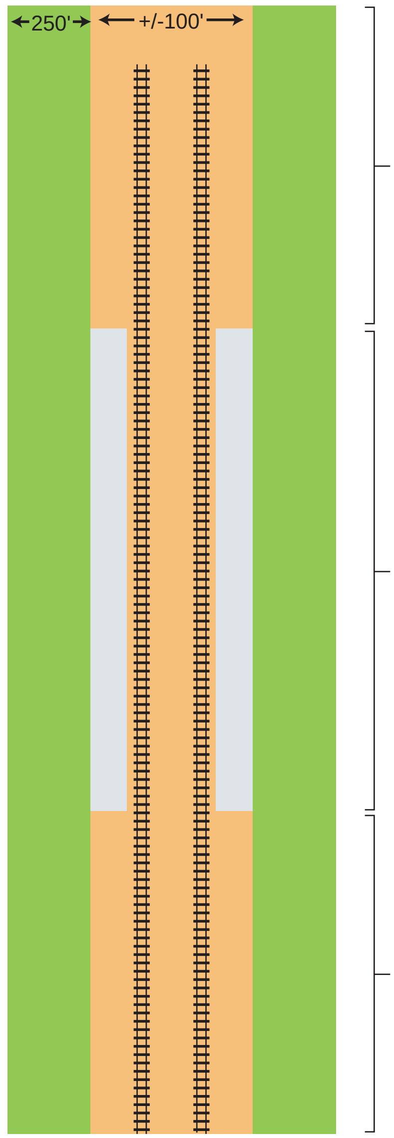


- Project Footprint—Permanent
- Construction Footprint—Temporary
- Wetland Study Area (WSA)

Impacts to Aquatic Resources

- Direct-Permanent (Fill)
- Direct-Temporary (Fill)
- Indirect
- Indirect-Bisected (Vernal Pools and Vernal Swales only)

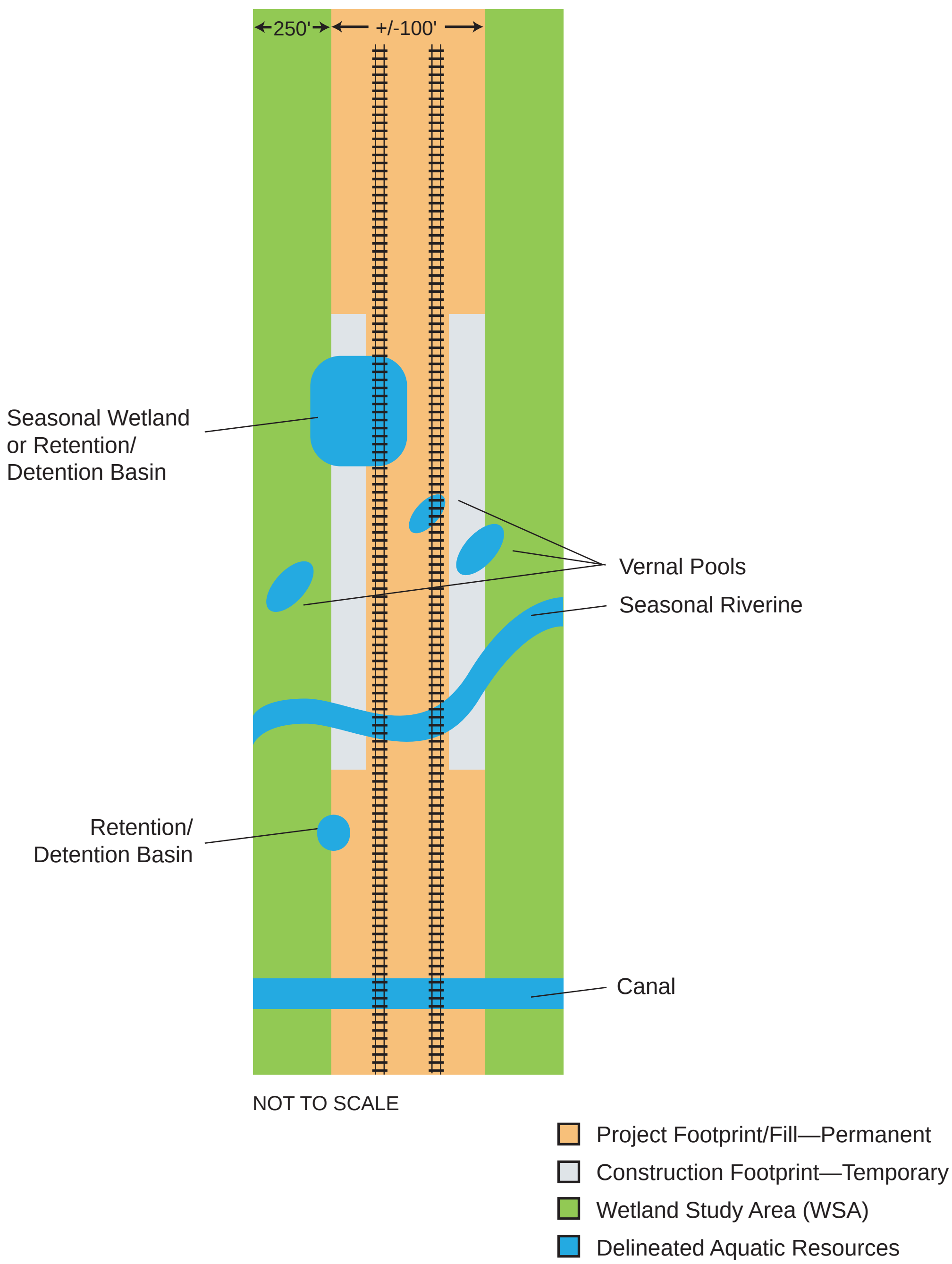
At-grade vs. Elevated



NOT TO SCALE

Project Footprint/Fill—Permanent
Construction Footprint—Temporary
Wetland Study Area (WSA)

Wetland Delineation



Construction and Project Impacts